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THE PRACTITIONER.

JANUARY, 1906.

CONVULSIONS IN TYPHOID FEVER.

By WILLIAM OSLER, M.D., F.R.S.,
Regius Professor of Medicine, Oxford.

ALTHOUGH nervous symptoms pointing to grave involvement of the nervous system are common enough in typhoid fever, convulsions are very rare. Murchison states that in 2,960 cases, they occurred in only 6. In one of these, the convulsions came on after much delirium on the 16th day, and the patient died comatose half an hour afterwards. The kidneys were found to be diseased. A second case, a boy of 13, died suddenly in convulsions on the 30th day. There was no post-mortem examination. In the third case, general convulsions occurred on the 11th day; recovery followed. In the fourth instance, the patient recovered after a severe fit of convulsions lasting a quarter of an hour, which occurred on the 14th day. The fifth case, a man aged 23, had on the 12th day two severe epileptiform convulsions, and recovered. The sixth case, a man aged 50, during convalescence had four epileptiform attacks. He had also thrombosis of the left femoral vein. He made a good recovery.

In our experience among between 1,500 and 1,600 cases at the Johns Hopkins Hospital, convulsions have occurred in 8. I have looked over the histories and have grouped them according to the conditions under which the convulsions happened.

First, *at the onset of the disease.*—The following remarkable case illustrates this very well, as the child was attacked in the street while apparently in perfect health, and was brought to the hospital not yet out of the attack, which was the starting-point of a severe and protracted typhoid fever.

Case I.—Joseph F. W., aged 7 (Hosp. No. 20,511), was admitted November 14, 1897. At 3 p.m. the patient had

dinner, consisting of bread and cheese and cucumbers. After dinner he was sent out for bread, and half an hour later was found in the street in convulsions. When brought to the hospital at 5.30 he was still having slight convulsive movements of the arms and legs. The pupils were contracted and equal; the pulse 100, of good volume. The convulsions ceased during the preliminary examination; the patient opened his eyes and regained consciousness. He was sent to the ward, and was put in a warm bath. The temperature was 101° on admission, and rose in the night to 104°. He had from this time on a steady temperature and all the characteristic features of typhoid fever. Rose spots were present on the 8th day. The case was a protracted one; the temperature was not normal until the 45th day, and he left the hospital on the 65th day. There were no other nervous symptoms.

In a second case the onset was equally abrupt, and the convulsions very severe.

Case II.—William V. (Med. No. 15,389), admitted March 2, 1903. White, male, aged 25. Not subject to epilepsy. The patient was unconscious when brought to the hospital. His friend stated that he had gone to bed the night before after a hard day's work apparently perfectly well. He had not been drinking, and had not been injured. About midnight the friend was awakened by a noise, and found him having "fits." The convulsions continued through the night, and he had had several on the day of admission. Between the convulsions he was comatose; they had only been able to rouse him once. The number of convulsions was not known, but apparently there had been a great many. There had been marked grinding of the teeth and foaming at the mouth. He had not bitten his tongue. He had not had "fits" before.

When seen on admission the patient was comatose; could be roused, but would not answer questions. In a few minutes he had a convulsion, affecting mainly the right side. There was more distortion of the right side of the face than of the left. The eyes and head were turned to the left. Sphincters were relaxed during the attack. After the patient was taken to the ward he had three convulsions, all preceded by a cry, affecting the right side more than the left. The patient did not bite his tongue. There was no paralysis after the

convulsions. By March 5, the mental condition had cleared, patient answered questions rationally. He had a typical attack of typhoid fever of 26 days' duration, and recovered. Positive Widal reaction.

Secondly, *as a manifestation of the toxæmia.*—The attack occurs during the course of the disease, and, though alarming, leaves no ill effects. Several of our cases have been of this character.

Case III.—W.T., aged 40 (Hosp. No. 1515), had a severe convulsion on the eighteenth day of his illness. It began while he was in the tub. No paralysis followed, and he seemed none the worse after it.

Case IV.—W. W. B., aged 27 (Hosp. No. 14,453), on the eighth day had a very severe convulsion, which lasted for fifteen minutes. He had very marked toxæmia, much muttering delirium, but no paralysis. He died from perforation on the 13th day.

There may be recurring convulsions of great severity, as in the following case :—

Case V.—Maggie M., aged 16 (Hosp. No. 21,695), admitted Jan. 6, 1898, on the 28th day of illness. Attack of great severity ; temperature high ; and she had in all 125 tubs. She had been delirious, and had had a good deal of tremulousness. At 6.30 on the morning of Jan. 29 the patient had a convulsion, lasting about a minute, twitching of the face, shaking of the head, and general movements of the muscles. The temperature at midnight had been 104·5°. When I saw her at the visit on the same morning, there was marked rigidity of the muscles on both sides. She had been very heavy and lethargic all night, but was aroused somewhat from the stupor. At 3.30 in the afternoon she had a second convulsion. The eyes were turned outwards and to the left ; the head was violently shaken. Fifteen minutes later she had a third, which lasted about a minute. There was frothing at the mouth, shaking of the trunk and limbs, and involuntary passage of urine. When seen a short time after this convulsion the head was turned to the left, there was much spasm apparently of the neck muscles. The eyes, too, were turned strongly to the left. At 4.15 she had a fourth convulsion. At 10.45 in the evening, when the temperature was very high, she was

tubbed, and she had a fifth convulsion in the bath, not lasting so long ; no paralysis followed these convulsions. She lay in an apathetic condition, with a very dull expression, and occasionally cried out. For several days there was marked rigidity of the limbs, and the knee jerks were increased. On February 5 and 6 she was very much better, and though the rigidity was still present, it was not quite so marked. On the 7th it had almost disappeared. She had bad bed-sores and the pulse was very feeble. On Feb. 9 the patient was removed to her home, where she died Feb. 17.

The following case illustrates very well this variety, due to the toxæmia, and not leaving any injurious effects :—

Case VI.—John H., aged 22 (Gen. No. 49,199), married, motorman on street-car line, admitted to Ward F December 10, 1904.

Family history and personal history are negative. He has been very strong and healthy ; weight 165 to 170 pounds. No source of infection discovered ; typhoid fever in house across the street.

Present Illness.—Gradual onset with malaise for two or three weeks previous to December 1, on which day the symptoms became much more marked—weakness, loss of appetite, headache. These increased until December 5, when he stopped work. On December 1st, following a purgative, he had diarrhœa and moderate pain in the abdomen. Diarrhœa stopped on admission.

On admission he was rational ; temperature 101° ; pulse 72. He looked ill, but was not extremely toxic. He had slight abdominal tenderness ; the spleen was palpable ; no definite rose spots. Leucocytes 10,300.

On December 11 the temperature rose to 104·5°. On December 12 rose spots were seen. Some slight abdominal pain and tenderness during the next few days. The toxic features increased gradually, the tongue becoming tremulous. The fever continued high. On December 23, intestinal hæmorrhage—200 cc. of blood passed. Considerable abdominal pain. On December 26, the mental features became much more marked, low muttering delirium, muscular tremor. This continued to December 31, when the delirium became active ; he attempted several times to get out of bed and required a

restraining sheet. On January 1 at 3 a.m. the patient had a tub, which he took very well, following which the temperature fell to 98°. At 4 a.m. the nurse noted that the patient's eyes were fixed; he did not respond to questions, and there were slight jerking movements all over the body. At 4.15 he had a general convulsion lasting but a few minutes. In about five minutes this was followed by another, and then at irregular intervals other convulsions, the last occurring about 4.40 a.m., this one being the most severe. The convulsions seemed to be general at onset, the arms and legs were jerked violently, the head was lifted from the pillow and jerked backward and forward. There was marked spasm of the facial muscles, drawing the corners of the mouth downward and outward. The pupils were widely dilated during the convulsion, contracted to the size of a pin-point afterwards, and equal. In the intervals the eyes were either fixed or showed a slight lateral nystagmus, they were rolled upward. The patient foamed at the mouth during the attack. The respirations were arrested throughout each spasm, the face became cyanosed, the heart rate increased, going as high as 176 per minute. Following the convulsions the patient became comatose, and could not be roused. Breathing was irregular and stertorous. For an hour afterwards there was jerking of the eyes from side to side, the eyes being rotated upward. The extremities were flaccid, no stiffness of the neck, no Kernig's sign. There was some hyperextension of the feet, the ankles being held quite rigidly. The knee jerks were diminished, equal. No ankle clonus, plantar reflexes not obtained. Reflexes of arms not present, cremasteric and abdominal cutaneous reflexes absent. Pulse 152 to the minute, heart sounds clear. At 5.30 a.m. lumbar puncture was performed, and 25 cc. of perfectly clear fluid obtained under a pressure of 230 mm. Cultures made from the fluid were negative. The coagulation time was four minutes, leucocytes 5,500. During the following day the patient was very quiet, but during the afternoon could be aroused, though he was still in a muttering delirium. There was incontinence of urine and stools. During the next few days the temperature gradually became a little lower, and, while still delirious most of the time, he was a little brighter than he had been. On January 4 he was quite rational. On

January 10 he had slight hæmorrhage. On January 10 a rather heavy ice-bag was placed on the abdomen, which remained constantly until 10.30 a.m., when, during the examination, it was found that underneath the ice-bag the surface of the abdomen showed a subcuticular mottling, apparently a beginning purpura. The ice-bag was at once removed. During the day the purpura became more marked, until the whole abdomen became covered with small purpuric spots, 2 to 4 mm. in diameter, some of which were confluent. Many of these were deep and of a dark blue colour, some were more superficial, of a reddish-blue colour. A few similar spots were seen over the lower chest, and two or three small purpuric spots were also seen on the back, no purpura elsewhere. The patient continued slightly irrational up to January 12, since which time, although he has been very irritable and nervous, there has been no delirium. Since January 12 the temperature has not been over 102·5°. He got better gradually, and made a good recovery.

Thirdly, the convulsions may be the result of *severe cerebral complications*, thrombosis of the vessels, meningitis, or acute encephalitis. One of our most remarkable and distressing cases was of this nature.

Case VII.—Dr. Oppenheimer, one of the house physicians, a very healthy man, aged 28, on the ninth day of a comparatively mild typhoid fever was attacked with very severe convulsions. As Dr. Thayer and I were making a ward-visit at noon on April 29th, 1895, we were sent for, and found him in some distress and with headache. The pupils were dilated, and in a few minutes he had a short, sharp, general clonic convulsion, beginning almost simultaneously in both arms. The eyes showed marked conjugate deviation to the left and upwards, the head also being somewhat drawn to the left. For about an hour the convulsions were repeated at short intervals. Morphia was given hypodermically, and chloroform. They then became less intense, and finally ceased altogether for several hours. During the convulsions there was profound unconsciousness, and in the severer ones great embarrassment of the respiration, so that he became quite livid. In the interval the patient appeared to be conscious, and spoke to those about him, and seemed to understand questions, though

he had a confused, frightened look. At five p.m. the convulsions recurred with great severity, and, in spite of inhalations of chloroform, they continued at intervals until ten o'clock in the evening, when in a severe one the patient died. The convulsions were general, but the more intense movements were on the right side.

The post-mortem showed thrombi in the ascending parietal and parieto-temporal branches of the middle cerebral artery. The meninges over these vessels contained small hæmorrhages, and the brain substance corresponding to them, while not softened, showed small extravasations of blood. There were extensive punctiform hæmorrhages in the grey and white substance adjacent to the thrombosed vessels. Dr. Thayer tells me that a recent examination of the sections of these vessels shows most extensive arteritis.

Of the six cases of meningitis in our typhoid series only one had a convulsion.

Case VIII.—M. H., aged 5, admitted March 21, 1904. The day before admission at twelve midnight she was heard to scream, and she went into a convulsion in which her legs jerked, her eyes rolled, and the seizure lasted from five to ten minutes. Several such attacks recurred during the night. She was dull and heavy after admission, but no further convulsions. Naturally enough tuberculous meningitis was suspected, but three days after admission the Widal was positive. On March 26 25 cc. of clear fluid were obtained by lumbar puncture. Typhoid bacilli grew from the cultures. The case was remarkable, as the patient became emaciated, typhoid bacilli were found in the urine, yet the clinical symptoms were rather more suggestive of tuberculosis than of typhoid. The autopsy showed a widespread typhoid infection. The bacilli were isolated from the gall-bladder, the liver, the urine, and the meninges. There was swelling and deep pigmentation of Peyer's patches, but no ulceration. There was also typical fresh tuberculous meningitis, with extensive tuberculous adenitis. The case is unusual as one of combined typhoid and tuberculous infection.

And *lastly*, in a few rare instances, convulsions occur, from unknown causes, during convalescence. I have reported a case (*Typhoid Studies*, vol. 3, p. 479) which I saw with

Dr. Bolgiano, in which, on the 6th day after the temperature was normal, following a relapse, the child, aged 11, had a severe left-sided convulsion, lasting for three hours, in which she was unconscious. Five days later she had a second convulsion, also left-sided, not followed by any paralysis. Convalescence was uninterrupted, and no damage was left by the convulsion.

The prognosis is not very grave, considering the alarming nature of the complication. Of the eight cases, only three died, one of them from perforation, and one of intercurrent tuberculous meningitis; only one died directly from the cerebral condition causing the convulsion. Claytor's three cases[1] in young soldiers all recovered.

[1] *Phila. Med. Journal*, 1900.

THE TREATMENT OF URIC ACID.

By JAMES F. GOODHART, M.D., LL.D., F.R.C.P.,
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Is the generally accepted treatment of uric acid satisfactory ?

It might almost seem that some apology is needed for introducing such a time-worn subject to the readers of THE PRACTITIONER, more particularly because I have nothing new to say, and what I shall say I have in a measure said before. But it is always well, I think, to keep on criticising commonly accepted opinions ; and if there be any one such in the practice of medicine that needs this because of the fixed hold it has obtained upon us, it is surely that uric acid in excess in the urine is the result of an improper diet. And absolutely so, in that if the man who passes uric acid can only substitute a diet that is free from materials that produce it, it can no longer be formed within him ; there will no longer be any such output ; he will be freed from his leprosy, and henceforward, if he abides by the prescribed regime, all will go well with him. Is this so ?

In attempting to answer this question there arises at once this difficulty : there is hardly any ailment, at any rate any smaller ailment, that flesh is heir to, that is not attributed by some to uric acid in excess. This may or may not be true, but if it is true, I can only deal with my question from a much more limited clinical aspect. There are many people who pass uric acid in their urine (gravel or cayene pepper, as it is appropriately called), and with this they associate certain symptoms, and to get rid of the gravel they undergo a certain routine treatment. What is this treatment, and is it true that it accomplishes what it professes ?

In considering this question from the point of view of the practitioner, I shall not touch upon the chemical side of the subject. This may well be left to others more competent to deal with it. My purpose is to state the experience of clinical medicine so far as it has seemed to me to work out, because the result of the two lines of investigation, up to date, do not seem to me to square. I have, of course, no thought of attempting

to set laboratory research and clinical medicine by the ears, but I have always contended that clinical observation is, or may be, "original" enough to rank by its own merits; that it has the right to take its own position, and to say to the worker in the laboratory, "These are the facts, how do you explain them?" Rightly regarded, clinical observation is the pioneer of all research; a hundred times a day it will give a man far-reaching glimpses into the future, if he can only keep his eye clear to see, and his brain fresh and keen to think. The passage of uric acid in excess, or the conditions which it is supposed to represent, is emphatically one of those ever-present and intensely interesting medical problems, which broadminded clinical observation should do much to solve, and which is therefore exceptionally well fitted for ventilation in the pages of THE PRACTITIONER.

Now what has the experienced practitioner to say upon this visible crystalline output, that is the point of my remarks. I am not going to dogmatise on the matter, or attempt to force my opinions upon any one. My mood is rather that of a soliloquy, a murmur upon paper, as to where I find myself, after all these years of seeing and dealing with uric acid in being. But I will add that what I say, I am certain that hundreds of others must have thought. I do not want to know the opinion of any one who has gone on the lines of accepting what our fathers have told us, and, acting upon them without adequate reflection, who has gradually come to believe in what he practises. That is the frame of mind responsible for too many of the fads and frailties of medical practice. I want to know what the personal observation and thought of the reader has taught him. Is it belief; or is it the "well-we-must-do-something-and-cut-and-dried-rules-have-an-advantage" attitude, or is it an attitude of honest doubt? I come in with the last. The presence of uric acid in the urine seems to me an absolute puzzle. To watch the moods of uric acid is to convince one that the question is a vital one, meaning by that just what x in an algebraical formula would mean. But within this circle, bounded by the unknown, this much at any rate may be said that in the complex working of the human organism there is an amount of subtle accommodation always taking place between one organ or tissue and another; some bankrupt

always needing help; some good-natured member ready to oblige a friend, of which chemistry as yet can take no account. For instance, years ago clinical medicine taught anyone with an observant eye that you may absolutely exclude the entry of all sugar-forming material into the body, and yet that the wonderfully complicated series of kilns within our bodies will contrive to manufacture sugar, and turn it out in the urine in quantity. The physiological chemistry of that day never taught that, and the treatment of glycosuria of that day devoted itself exclusively to keeping sugar out of the diet. It is surely quite in recent years that this *x*, still more or less of an enigma, of diabetes has been taught as a fact. It is exactly the same now with uric acid, for there can be no doubt that the all-prevailing teaching at the present day is that uric acid comes exclusively from certain proteid foods, and that if only we do not put these into the body, we shall get no uric acid out. It is diet, diet, diet, for the man who passes uric acid. It is "get the acid out of your system" and all will be well. I cannot see that clinical medicine teaches this in anything like the unqualified way in which the doctrine is inculcated upon those who earnestly believe in its truth, or upon unfortunate patients. Chemistry may seem to teach it, but, if so, so much the worse for our knowledge of chemistry. We must look closer into the matter until we see that it has not yet come to the end of discovery in this quarter, and that its synthetic side, as seen in the human body, has marvellous ways of evading direct observation and of bringing to naught any reasoned deductions.

Clinical observation certainly teaches that in many cases you may diet, and absolutely exclude all uric acid forming food of whatever kind you assume that food to be, you may wither up your patient into a shrivelled, juiceless, prematurely aged being, and there will yet, by some means or another, under favouring conditions, be squeezed out of his tissues enough uric acid to form a large deposit of red crystalline matter in his urine. There is still a very large *x* outside diet still to be grappled with and explained by physiological chemistry.

I have set many a person to work at investigating the cause of this evidence of "acidity," I have asked many a

doctor thus affected, if he could tell what caused it, and I have generally been met with the reply that it was as yet beyond his ken. I have, of course, met many who have found salvation in diet (many also, by the way, who by the same method have found the opposite), but in most of them, when carefully questioned, I think their so-called cure has been, like the cure of asthma by nasal operation, a relief from gross discomfort, but a more or less frequent relapse into minor discomforts that linger longer, and indeed may almost be said to form part of the round of daily life, and this too by the reduction of the body to a state of semi-starvation.

For instance, here is a recent case of a man somewhat enthusiastic in the casting out of his system the devil that possesses it. He is clever, well educated, and works hard with his brain. His breakfast is a cup of coffee, a bit of toast and butter; lunch is a roll and butter and coffee again; dinner, a small amount of fish or meat—very little, as he dislikes meat; vegetables of one or two sorts, a milk pudding and fruit. I do not say that this is what an expert in uric acid would advise, but it is what a layman arrives at, after having received advice from an expert, and it is undoubtedly born of advice, very prevalent in these days, that shies more or less at all proteids, and especially at those that are derived from animal food. The result is that a large excess of carbohydrate is taken, and the man too often rushes into the arms of the condition he is trying so anxiously and carefully to avoid. These strivers after freedom from their *bête noire* nearly always land themselves in a number of small discomforts where their ideal of bliss is just out of reach, yet, as they think, well in sight, and ever more and more something fresh is eliminated from the diet as the thing that keeps the ship out of port, with the result, as in the case to which I have referred. It wants no doctor to see that the man is starved!

I am not concerned to deny that diet has a share in the production of disease by the formation of unnatural products, or of natural products in such excess as to produce disease. It is my purpose to insist that "acidity" is brought about in several ways, at any rate that it does not attach itself exclusively to any one class of food, but if anyone is to be banned on this account, my observation would lead me to look to the carbohydrate group, and not to the flesh foods. But diet is after all not the

initial fault in many, perhaps not in most, cases. Glycosuria may be produced by the ingestion of too much sugar, and I do not doubt that an uric acid output may be the direct outcome of too much food of one kind or another, but take them all round, I should say that the subjects that *complain* of acidity (there are those who though passing it in excess do not complain of it and are, so far as they know, in perfect health) are obviously deficient in something that in others makes for health.

Sitting one day on a motor-car, when the machine would not run smoothly, and the driver could not find the cause, he said to me, "Motors are like men"—I am not sure he did not say women—"they have their good and bad days and their tempers. Some days they will not go, and on others do a long non-stop run without the suspicion of a hitch." What is that condition in man? To answer that question one would need to answer this: Why do your corns shoot in changeable weather? as well as many another, equally out of range as yet of any exact science. What is there in individuality? It surely cannot be maintained that it is only uric acid! On the contrary, uric acid depends upon it. With every probability of truth, it may be said that the cause of uric acid production in excess, like the production of sugar phosphates and other abnormalities, is due to a defective driving force, which leads to an imperfect metabolism of natural and wholesome foods, and what is needed to restore the balance is less the change of food than the steam or nervous energy that drives the machine, and the oil that enables its mandates to be properly conveyed.

My experience of uric acid passers is that there are two groups. One comprises those who are apparently quite well; have no complaints to make; who take all things cheerily; and who notice the presence of sand, as it were, by accident: the other, a much larger group, who, in association with the passage of sand, are generally miserable; they are nervous and apprehensive about themselves; they pay attention to every ache and pain; they have frequent headaches, chest aches, abdominal aches, rheumatism here, and gout there; they are well posted in all their excretions, both as to quality and quantity; and, in short, there is

not an organ, or tissue, in the body that does not let these unfortunate people know that it exists. Such are subject to fits of depression, that come on without rhyme or reason; they may be sleepless; they frequently suffer from the malady known as mucous colitis, and are generally ardent advocates of some particular diet, to which they adhere with an ever-increasing rigidity and faith. Some of them are less steadfast, and, finding one plan fail them, try another; but it is all the same, they still pass uric acid, they are still "so acid," or "full of acid," as they express it, and they are ever in pursuit of the new and perfect food. If they were close observers enough they would notice that the uric acid appears and disappears absolutely without any correspondence with the particular food that has been taken. In some cases there almost seems to be a sort of periodicity about its coming and going: its coming being associated with all sorts of nervous dreads; its going equally with such a sense of well-being and happiness, as to fill them with a sense of forgetfulness of the past, and a temporary disbelief in any recurrence of their woes; a disbelief, alas! often destined to be but short-lived.

Uric acid, in its coming and going, is quite like gout and the paroxysmal neuroses, and undoubtedly lends itself very readily to the hypothesis of some nervous origin in a want of control, and some perverted metabolism of such causation. And it is obvious that the very existence of such vagaries is enough to render any opinion as to its cause but tentative.

But as regards particular food, red meat seems to be held in most abhorrence, as productive of acidity, so often is one told when there is any suspicion of goutiness, that the patient must not take any butcher's meat, but live on white fish and chicken, and not much of those. But, try as hard as I can to see with other people's eyes, I cannot detect this predominant evil influence of meat in causing the appearance of uric acid in the urine.

On the other hand, I do think that, perhaps, rich gravies, sauces, spices, and pepper *may* have an adverse influence. They are clearly articles likely to disturb a weak digestion. I doubt if plainly cooked meat of any kind is other than readily digested, if well masticated, and much better than many things usually held in higher estimation. There are, of course, many

people who will tell you they are better without meat, with meat they have headaches, and this, that, and the other discomfort, from which they rightly consider they ought to be free, and that living upon a vegetable diet, for example, is much healthier for them. I do not dispute it for a moment. I invariably say: "If you have a diet that agrees with you, by all means keep to it." But the vegetarian, or milk-feeder, or the eulogiser of the last new food, is not content with this, he holds that such an admission gives the case away for meat, and straightway wages war against all the rest of the world because it does not follow his example. In so far as this crusade tends towards simplicity of diet, I do not doubt that it is of great value, for although I do not think there can be the least doubt that a due proportion of meat in the diet is the most appropriate one for the great majority of mankind, I am equally convinced, as I have just now said, that the trimmings, in the way of sauces, and the many different things that are put into the stomach at each separate meal, are the details to which one may take exception. We all know there are those in considerable numbers at the present day, who, by advice or their own insight, live largely on meat and water. I am not expressing an opinion now on the value of this diet; but, at any rate, it may be said that it does not lead to an excess of uric acid in the system, as ought to be the case, if we are to accept the statements of those extreme doctrinaires, who rule all meat out of their category of diets. It is, indeed, well known that those who live thus have mostly done so to rid themselves of ailments that another school ascribes to this same excess of uric acid.

So much *for* meat diet; so much *against* the rich or mixed living that too often accompanies it, but which ought to be dissociated from it, if we are rightly to judge of the ill effects of red meat itself.

But now for other foodstuffs: and, if I am sure of anything, I am sure of this, that a food that too largely consists of bread and starchy material of all kinds leads to gravel in no small number of cases. I made this statement years ago, as regards children, who pass sand, that, while nearly in all cases they were taken off red meat, because of it, the excess of starchy food really needed limiting, and I do not doubt that,

from Dr. Eustace Smith, I learned my first lesson in this respect, although even in those days I was wont to contend that a neurotic working of the machine lay behind, and in some way determined the fault of digestion.

I think it was Dr. Latham who, some years ago, worked out an indictment on chemical grounds against fats and sugars. I am not sure about sugar in moderation, indeed, I think that in strict moderation it is a good article of food at all ages; but as regards fats and cream, I am inclined to agree, and I think some fats are more harmful than others. It seems likely that, of all fats, bacon fat and pork fat are the most easily digested.

Cream, I suspect, has its limitations. In strict moderation it is seldom hurtful, for there is very little in the common objection that it makes one bilious. Those who avoid it are commonly "bilious" because all their organs are starved. But without doubt in babies one may almost say that fat (cream) is a more important food than albumen, and even so, also at full age, in various gastric disorders, after middle age, cream taken in any excess may associate itself in some with the output of uric acid.

I think, therefore, that those who are inclined to the passage of uric acid should be careful as to the consumption of unadulterated starch, and sugar, and fat, including cream, but I also think that all these things are probably digested better early in the day than late; and by themselves than when five or six different forms of foods are put into the stomach at once. I never advise anyone to exclude them absolutely, as is much too often done.

Salt is another article of diet that, if consumed with any freedom, as is not uncommonly the case, is not above suspicion. I do not doubt, of course, that it is a necessary and wholesome article in moderation, but, in those prone to form uric acid in quantity, it may be prejudicial, and there are numerous observations scattered throughout medical publications that seem to point to this conclusion. Of some of the acid fruits I think the same. Some people will consume lemons in such a quantity as would imply that, in any number, they are quite harmless because "they are good for rheumatism"—which is often gout. But lemon juice is by no means the neutral article that is supposed. It will often

upset the gastric, or intestinal, digestion in a very decided manner, and so also will currants and strawberries and plums. The late Dr. Milner Fothergill, recognising the harmfulness of some fruits in some persons, recommended that, in making fruit tarts of the acid fruits, a drachm of bicarbonate of potash should be cooked with each pound of fruit, and this system has been endorsed by others; but it does not sound so appetising as to induce one to follow it, more particularly as it does not appear certain that those, who have spoken of its value, have ever tasted such dishes themselves. Vinegar is one more article that I will just mention, as it is probable that it is, either in itself, or in its influence on other things, or in association with other things, indigestible if taken in anything more than a mere flavouring quantity.

Wine shall be my last item on the list, and of it I have to say that it has appeared to me to be much more prone to call out erratic tendencies on the part of the digestive processes than food of any kind ever does. And I find myself in complete accord with those who think that the great majority of men, and still more of women, are, in the present state of their environment, much better without it. I have no sympathy with those who would forbid anyone an occasional glass, for I cannot bring myself to think so meanly of the human kiln as to believe that it has not more power of accommodation than this implies. The daily habit is all important; but if a glass of wine is taken—say, at an occasional dinner—it matters not what be the kind of wine, no real harm is likely to follow, on the understanding that a glass means a glass, and not half a bottle. I do not doubt, too, that it is true that some do require a small quantity of alcohol as part of their daily food, and what form this should take must be determined much by the patient's own observation, as to what suits him best. No doctor can do more than make a rough guess. But, as a general rule, the lighter the wine the better, and even then it is a good rule not to take it year in and year out, it is much better to do without any some days, when work is less, appetite greater, and so on. I am afraid I am somewhat heretical as regards wines, but this I know, as has often been said before, that there is many a gouty man who does well on a glass of port after

his dinner; many another who takes his two glasses of champagne daily, and seems the better for it, and I have still personal leanings in favour of the wholesomeness of a glass of good old sherry in cases where a little wine seems a judicious prescription. I am as much as ever an opponent of the prevalent dictum, "You must not touch wine, you must drink whisky," which too often means to the patient, "A glass of good wine is poison, I may take as much whisky as I like, and it is harmless"—one of the most mistaken and mischievous beliefs that ever plagued a world.

Let me now say a word or two upon conditions, other than dietetic ones, that circumstances have led me to think have an occasional bearing upon the formation of uric acid in excess, although I will say again, it is difficult, indeed, to say which is the cart, and which the horse. And, first, as regards starvation, I have come to think that there are some in whom, if the proper amount of nutriment required by the constitution is denied, the digestion will become so perverted, that the proper derivatives will cease to be formed, and uric acid, and other products that are not ordinary, will come in their place. And, for some confirmation of this, let me call to mind the well-known fact that many a careworn, harassed man, really ill with gout, has temporarily dispelled all his troubles by sitting down to, and eating a thoroughly good dinner in cheerful companionship. Clearly, one explanation of this may be that the abundant supplies taken in have so stimulated the system, that the proper products are again formed, and the uric acid has vanished from that moment. Take the case, again, of a man, who has been passing uric acid for months, who has not been well all the time, and who has dieted himself in every conceivable way that he can think of at all likely to rid him of his plague, and with no success. Suddenly, perhaps, he feels a little better; certainly he becomes sick of all his precautions; he begins to eat anything and everything; his troubles disappear within 24 hours, and perhaps may not return for many months; not, indeed, till he again is becoming a little stale, and is wanting a holiday.

The man, who does not look at everything from a contracted dietetic standpoint can tell of many such cases,

and I cannot but think that diet, and diet alone, has been ridden to death for this class of ailments, and to the detriment of the elucidation of the true nature of the disease, if it be one.

And, involved in this question of the effect of diet, is the question whether certain things are harmful in themselves, as directly providing the pabulum for the production of uric acid, or whether they are more of the nature, say, of ferments, if such a term may explain my meaning; that is, bodies introduced into the system that set going processes in other elements, unlock certain compounds, which in the end lead to the output of the particular ash. And the reason for making the suggestion lies in what I have said: that it would appear as if certain foods are at one time harmful, and at another quite the reverse. I think this especially, perhaps, applies to fruit, starch, and wine.

Next, I may say a word upon constipation as frequently associated with the output of uric acid. I believe Dr. Besley Thorne has especially insisted upon this point, and, if so, I think he is right. At any rate, I have observed that, in some cases, the output has corresponded with the existence of constipation, and I have also observed, as already mentioned, that it is likely to be associated with that condition of the colon—catarrh, or what not—that we are in the habit of calling by the name of mucous colitis. I cannot deal with this complaint here, but I may say this of it, that it is an exceedingly common complaint, and that I believe no one can study it without coming to the conclusion that it is more of the nature of an abdominal neurosis than it is of any real disease of the mucous membrane of the bowel. And in the association of urinary gravel with mucous colitis, one may perhaps obtain new light upon the subject of uric acid, for the suggestion is patent that in a large number of cases the formation of uric acid is first of all a nervous aberration, by which all the natural digestive processes are upset, and the uric acid is the result of the imperfect combustion. This accords with many facts in its history; it accords with its peculiarly erratic coming and going, a coming and going, that, as I have said, baffles explanation. It is in accord with another fact, that it sometimes seems to play peep-bo with sugar and albumen and oxalates and phosphates. One hour you may find one of

these products, at another there may be present any one of the others named; also, with the facts mentioned, that it is often associated with considerable nervous depression, and that a good dinner may alter the whole tenor of months of ill-health as it were in a moment. Indeed, the only fact with which it does not seem at first sight to fit is that uric acid is often passed in health, when there are no symptoms of illness or discomfort of any kind. But this is equally a difficulty for those who would put all those who pass uric acid under a rigid system of diet, for these people are not ill. But there is a ready explanation of such cases in this, that it is not necessary to insist that the abnormal excretion of uric acid proceeds always along the same lines. If uric acid is indeed the active poison it is said to be, then it ought never to be present without some of the symptoms attaching to the poisoned system. If, on the other hand, there is a rich man's uric acid and a poor man's, to adopt the terms that are well known for gout, then one can understand that in the well-to-do (in health), it is merely an excess of steam that is being let off; that it represents an amount of intake that has not been properly utilised; and that it causes no symptoms in consequence. If, on the other hand, the overworked, the worried, the anxious, takes to passing uric acid—the poor man in the widest sense of the word—then he is making uric acid out of his very life's blood, so to speak, and one can understand how the presence of waste of any kind is then associated with so many symptoms, and such evident signs, of deterioration of health.

There must be many, one would suppose, who, at certain moments of their life, whether they have been times of great anxiety, or shock, or excitement, have had the knowledge or sensation that their juices had been turned to gall and bitterness. Such a thing is surely possible, indeed, one may say likely. Some sudden momentary inhibition of the energy of the great abdominal sympathetic, for example, arrests the natural processes of all the viscera under its control, and the excretory output is changed into uric acid in one case; into sugar in another; into phosphates in another; and so on. It is not necessary to labour the fact; in some sort or other it is so certain.

And here I may properly meet an objection that will certainly be raised. It is very commonly supposed that when at the various spas that are credited with washing out uric acid from the system, a quantity of sand is passed in the urine, herein is the proof of the efficacy of the water. But, of course, this is not so, or at any rate this is a very bald presentation of the facts. I have asserted elsewhere as an opinion, that the uric acid passed in such quantities at Contrexeville, and other kindred spas, is, much of it, manufactured on the premises. And I do not doubt that this is true. People do not go out there gravel mines, and come back worked out. They go out ill with certain symptoms that are attributed to a gravel mine, and they come back in many respects very much better, but there are many other possibilities than the one of washed-out uric acid. They go out with a jaded nervous system, with a disturbed digestion, with a disordered liver, and an impure blood, the result of all the organs being for the time played out. The immediate effect of the waters is to make many of them worse, and even for the whole time they are there, some may feel but little benefit, so that the bath doctor is always ready with the common sedative, the benefit will come by and bye (which is true), coupled with, "You must come again next year," which, bias notwithstanding, is also, I daresay, good advice.

Who knows how long it has taken to form the cayenne pepper-like deposit that appears in the urine, say, on any particular morning? No one perhaps can say precisely, but anyone who passes it can give a pretty good guess, based upon the erratic nature of its appearance and his associated sensations. From what I have been able to elicit in such cases, I believe, that 48 hours or even less is in all probability sufficient for the formation of crystalline masses large enough to be almost called minute calculi.

The coming and going of sand in this way is, I believe, incompatible with the supposition that its substance has been lying *dormant*, perhaps I may say; waiting to be flushed out upon the exhibition of a large quantity of water. It would appear on the contrary that uric acid must form rapidly, and at the bidding of an intermitting energy, the ebb and flow of which the patient can recognise as such, low down in the

springs of his being, for he can ofttimes forecast the result with certainty many hours before the actual appearance of any crystalline deposit, and if so, it is much more reasonable to suppose that the patient goes to the bath ill from a concatenation of unhealthy products, not uric acid, but some thing or many things that will or may go to form that ash in the efforts of nature to purify its own machinery. The output of uric acid is always an effort to right the machine, but it is the result of an incomplete synthesis. A man at home may be so deranged that he cannot even get so far in the attempt to better himself as is seen in even uric acid, and when he arrives at "the cure," he is soon stimulated into this partial restoration, and uric acid appears, but, mind, all formed on the premises. After a time he is still better, and the uric acid all vanishes. Why? Certainly not because it has all been washed away, but because the level of health has reached that height that the kilns are again in full work, and the soot is no longer thrown down. Surely this is the explanation why some people pass uric acid and have no symptoms—they turn out a certain amount of ash of this description simply because they are giving their organs too much to do; it is a surplusage of work begun but not completed, but it is no evidence of failing power on the part of the viscera, quite the contrary, the organs have been putting in extra time. This, too, explains how a man should often and often, after feeling depressed and out of sorts, be able to foretell its coming, as I have said he can; it explains how a man thus passing it, is instantly restored to health by having a good stimulating meal, and it also indicates what I believe to be true; that the worst of all treatments for many of the symptoms of what is supposed to be lithæmia, may be a diet so rigid, as to keep the patient always thinking about himself.

Perhaps someone will now say, "What then is your own treatment for these uric acid troubles?" Well! I have not got one. I can give plenty of good advice though, and advice is heads, and "treatment" tails! Well considered advice is here the one thing needful. In such cases as I have in mind, the doctor stands to the patient as a man with some knowledge of physiology, and who, looking at him, tries to penetrate the inner workings of all the man's organs, mind, and body, under

the complex conditions of his daily life—his environment. It is not man in general whose unravelling is attempted, it is this one individual, all important to himself and his clan. Your past experience is nothing to him, except as it enables you to solve the secrets, the quips and cranks, of his particular machine, and to advise according to that insight, as to its smooth running. All doctors can be, and must be physiological experts by thought, although they cannot be by sight or by the teachings of actual experiment. And what does this mean? Surely this, that in one case your advice will carry a glass of port wine at eleven a.m., or, as a late celebrated physician used to say, its equivalent, if there is one, of which I am not quite sure. Very injudicious advice to commence with, some will say. The late Dean Vaughan is said to have advised those who read with him always to make a point upon the first page of a sermon. Humbler men may well be content if they are able to make one even on their last, and this is a point, if it amounts to no more than the aphorism—that drinking between meals is dangerous. To the next man our physiologist may perhaps find it necessary to say, "Cut off your telephone, and avoid the financial columns of your morning paper;" to another case it may be, "Leave your husband and children." Yes, women are sufferers as well as men, and I am only suggesting a temporary estrangement. In others it is, "You want a holiday; get more pleasure into your life if you can." "Do less work, and have more play;" or, "Your responsibilities are too many, the excitements of your life too great." It may be that monotony is the bane, and a hobby the remedy. *With* all these, or beside them, there is the "Eat less," or it may even be, as I have said, "Eat more." "Drink less;" I will not say drink more, lest I be misjudged, but doctors must always try to hold the balance true, and I recall from the interesting biography of the late Sir James Paget by his son, Mr. Stephen Paget, that that distinguished man would often praise God for good food *and wine*. But let the physiologist continue:—"Study for yourself the way—and not so very narrow a way either—of physiological righteousness; eat less meat, or may it even be none; eat less of the rich things of the table, the unconsidered trifles that are the outcome of latter-day social society"; and so on. This for

one man, that for another, but strict moderation in all things, mind and body, is the rule of life for avoiding uric acid and allied troubles.

I have said nothing about drugs, except port wine, but I will now say this, that all the uric acid solvents, so much vaunted, appear to be equally useless for that special purpose, but I believe that salines have their value, if given with discrimination, for facilitating the excreting power of the several abdominal glands. And, in this way, water is probably one of the best remedies, but even water drinking, if excessive, is, I think, not to be indulged in with impunity, for I am, by no means, prepared to assent to what appears to be the popular belief that water being harmless, it matters not what amount is imbibed in the 24 hours.

In my opinion, the late Sir William Roberts' simple prescription of half a drachm of bicarbonate of potash in a tumbler of water at bedtime, to stem the nightly acid tide, is, on the whole, one of the most useful recommendations, apart from tonics, cures at watering places, and change of scene and air.

(A) ON SOLUBILITY, AS APPLIED TO URINE. (B) ON THE THEORY OF GOUT—A PROTEST.

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URINE is a complex aqueous solution of different kinds of molecules, which may be broadly classified into two groups :—

Group I.—Non-ionised molecules, which conserve their integrity in solution, *i.e.*, are not dissociated, or only so to a trifling extent. These are represented in normal urine chiefly by urea and kreatinin. In pathological urines they are represented by such compounds as sugars and proteids. These non-ionised molecules are electrically neutral, and are non-conductors of electricity.

Group II.—But urine is an electrolyte, *i.e.*, a conductor of electricity. It owes this property to the fact that it contains molecules which are more or less freely dissociated into ions, or sub-molecules, the carriers of electric charges. Electro-positive ions are marked "$\cdot$"; electro-negative are marked "$'$."

In normal urine the H$\cdot$ ions and the OH$'$ ions are nearly balanced. As a rule, however, the H$\cdot$ ions (derived mainly from the acid phosphates of the alkalies) slightly preponderate. Hence, the usually acid reaction to litmus of urine. Yet the amount of H$\cdot$ ions is not adequate to affect certain other indicators, *e.g.*, Congo red and tropœolin. These indicators are readily altered in colour by the stronger, *i.e.*, more dissociated acids, *e.g.*, HCl, and this is what is really meant by saying that normal urine does not contain a free acid. An amphoterous urine is one in which the H$\cdot$ ions and the OH$'$ ions counterbalance each other in regard to their action on blue and red litmus paper, each ion producing a feeble action on its own account.

The principal classes of salts in urine which belong to Group II. are :—

(1) Chlorides, *e.g.*, sodium chloride (NaCl). Ions = Na$\cdot$ and Cl$'$.

(2) Sulphates, *e.g.*, potassium sulphate, final ions = $K\cdot$; $K\cdot$; and SO_4''.

(3) Phosphates, *e.g.*, sodium phosphates:—Na_3PO_4. Na_2HPO_4. NaH_2PO_4. Ultimate ions = $Na\cdot$ (1, 2, or 3 atoms) and $(PO_4)'''$.

(4) Carbonates, *e.g.*, potassium carbonates, K_2CO_3 : $KHCO_3$. Final ions = $K\cdot$; $K\cdot$; H; and CO_3''.

(5) Urates, *e.g.* (acid), sodium urate, $NaC_5H_3N_4O_3$. Ions = $Na\cdot$ and $(Ur)'$ (monobasic radical of uric acid).

Now many important clinical and pathological conditions of urine are related to, and depend upon, the relative solubility of certain compounds under different conditions, and, in the remarks that follow, I wish to look at familiar facts from this point of view, chiefly with the object of assisting beginners in the study of clinical medicine. A few simple general rules of solubility of urinary salts can be stated, which, when once thoroughly apprehended, will save the novice from many blunders.

It is essential to note the elementary fact that the common words, "neutral," "alkaline," and "acid," as applied to salts, are ambiguous, and are apt to be loosely used in two different senses:—

(*a*) In reference to action upon litmus, any salt that reddens blue litmus is styled *acid*, and any substance that blues red litmus is termed *alkaline*.

(*b*) But the technical or chemical sense of these words is briefly this:—A *neutral* (better, *normal*) salt is one in which the valencies of the basic and acid radicals exactly counterpoise in worth. Thus: $Na\cdot Cl'$: $K\cdot_2(SO_4)''$: $Na\cdot_2(CO_3)''$: $Na\cdot_3(PO_4)'''$.

Some neutral (normal) salts strongly redden blue litmus, *e.g.*, $CuSO_4$. Others, *e.g.*, Na_3PO_4 blue red litmus.

An *acid* salt is derived from any acid with a valency higher than one (*i.e.*, polybasic) by *partial* replacement of hydrogen by a metal, *e.g.*, from carbonic acid, H_2CO_3, we have $NaHCO_3$ (acid—or bi-carbonate of sodium). From sulphuric acid, H_2SO_4 we can get $KHSO_4$ (acid or bi-sulphate of K). From phosphoric acid, H_3PO_4, either Na_2HPO_4 (monohydric, or disodium, phosphate) and NaH_2PO_4 (dihydric, or monosodium, phosphate).

The term alkaline salt is ambiguous, for it may mean either—(1) A salt of an alkali radical (K : Na : NH_4) considered irrespective of its action on litmus; or (2) A salt that blues red litmus.

Now Na_2HPO_4 and NaH_2PO_4 are both salts of the alkali metal, sodium, and are both, technically, acid salts. Yet the former salt (Na_2HPO_4) blues red litmus, and the latter (NaH_2PO_4) reddens blue litmus, and is the chief contributor of the surplus hydrogen ions which cause the acid (litmus) reaction of ordinary urine. These seeming paradoxes can be elucidated by the dissociation hypothesis.

RULES FOR SOLUBILITY.

(1) *Chlorides.*—All chlorides which occur in normal, or pathological, urines are soluble in water. They never, therefore, occur in urinary deposits or concretions.

All metallic chlorides are soluble in water, except calomel, white precipitate, and silver chloride.

(2) *Sulphates.*—The sulphates of the urine are soluble in water. Calcium sulphate is the least soluble, and has very rarely been observed in a sediment. All metallic sulphates are soluble, except those of barium, strontium, and lead.

Sulphates and phosphates are insoluble in strong alcohol, Hence the white zone of opacity when strong alcohol is floated on urine. The chlorides are soluble in spirit.

(3) *Phosphates.*—(*a*) All possible phosphates of the alkali radicals alone (K : Na : NH_4) are readily soluble, and are never found in deposits.

(*b*) All the *normal* (neutral) phosphates of other metals are insoluble, *e.g.*, calcium, $Ca_3(PO_4)_2$; magnesium, $Mg_3(PO_4)_2$; and ammonio-magnesium phosphate, $MgNH_4(PO_4)$, miscalled "triple phosphate."

(*c*) *Acid* (*i.e.*, mono- and di-hydric) phosphates of calcium and magnesium are generally readily soluble, except $CaHPO_4$ (mono calcic phosphate). This salt forms the "stellar phosphate" crystals not infrequently met with in urine. These crystals sometimes appear as an iridescent film upon neutral or alkaline urine which has stood for some time. All these phosphates are soluble in acetic acid. By heat, the soluble

acid phosphates of Ca and Mg (especially in feebly acid or neutral urines) are often precipitated as tri-calcic (and magnesic) phosphates owing to a thermal molecular rearrangement.

(*d*) Ferric phosphate (grey-white precipitate on adding Fe_2Cl_6 to urine), unlike the other phosphates, is not appreciably soluble in dilute acetic acid. Dilute HCl dissolves it and every other phosphate likely to be met with in clinical testing.

(4) *Carbonates.*—All possible carbonates of the alkali radicals (K : Na : NH_4) are readily soluble, and never occur in deposits or calculi.

Normal carbonates of other metals, *e.g.*, Ca and Mg are insoluble, and not infrequently occur in urinary sediments, associated with Ca and Mg phosphates.

Acid (bi)carbonates of Ca and Mg are soluble.

(5) *Urates* (lithates).—(*a*) Mono-metallic (acid-, bi-, quadri-) urates form the common uratic pink, or reddish deposits. According to Luff, the composition of the amorphous urate sediment is a mixture of quadri-urates of NH_4, Na, and K in the relative proportion of 7, 5, and 1 molecules.

These urates are sparingly soluble in the cold, but are easily brought into solution by gently warming the urine to a temperature far below that needed for the coagulation of proteids. No other inorganic deposit in the urine behaves similarly.

The most abundant constituent of uratic sediments is (acid) urate of sodium ($NaC_5H_3N_4O_3$). Its solution in water feebly blues red litmus, and reddens phenol-phthalein. The solubility of (acid) urates is closely dependent upon not only temperature but also upon the grade of acidity of the urine. Acidification to the extent of one single drop of dilute acetic acid will frequently cause opacity in a bright and clear urine owing to precipitation of the acid urates. Conversely, Roberts has shown that the addition of an exceedingly minute quantity of an alkaline carbonate—not sufficient to sensibly affect the reaction of urine to litmus—notably inhibits the precipitation of uric acid from normal acid urines (*Croonian Lectures*, 1892, p. 53). So narrow is the border line between solubility and insolubility.

No salts of the alkali metals alone other than (acid) urates ever occur in urinary sediments or calculi.

(*b*) Di-metallic (normal) urates are formed at once when a little liq. potassæ is added to a deposit of urates. The precipitate clears up because normal urates are very soluble.

But they are very unstable in aqueous solution, and are even decomposed by CO_2 gas. Hence they do not, and, indeed, could not, occur physiologically in the urine, or fluids of the body, although their presence is sometimes erroneously assumed by writers. They can exist in solution only in presence of an excess of alkali, and cannot, therefore, come into any rational theory of gout, or of calculous formations.

Assuming the ordinary view that uric acid is dibasic, *i.e.*, contains 2 atoms of replaceable H, we may classify urates thus :—

(*a*) *All* the H of uric acid replaced by metal, *i.e.*, $M_2\bar{U}$ = normal (neutral) urates. These never occur in the human body.

(*b*) *Half* the H replaced = $MH\bar{U}$ = the so-called acid (bi-urates). Frequently precipitated as gravel and calculi.

(*c*) *One quarter* of the H replaced, *i.e.* $[MH\bar{U}.H_2\bar{U}]$ = quadri-urates. Probably the form in which urates exist in the blood.

(*d*) *Nitrates.*—All normal metallic nitrates are soluble in water.

Nitrate of urea is readily soluble in water, but is insoluble in *pure strong* nitric acid. Hence, the crystalline zone of urea nitrate often observed (especially in high-coloured febrile urines) when urine is *carefully* floated over the acid. Impure yellow nitric acid decomposes urea with copious evolution of nitrogen and CO_2 gases.

To sum up, the three simple, but essential, points for the student to grasp are these :—

(*a*) The behaviour of the deposit to water, cold and hot.

(*b*) The action of dilute acids upon the deposit.

(*c*) The action of caustic alkalies (*e.g.*, liq. potassæ) upon the deposit, or calculus (powdered).

GOUT AND URIC ACID.

Among pathological questions relating to solubility, a foremost place is taken by uric acid and its compounds.

Furthermore, we have to take into account the physiological genesis of uric acid, which is still but imperfectly understood. But this point has a less direct bearing on clinical and pathological problems. It may safely be said that few suppositions have longer dominated medical thought, influenced daily practice, and guided popular opinion more extensively, than the uric acid theory of gout. Yet some clinical observers, with whom I entirely associate myself, have long and increasingly felt convinced that this theory is inadequate, and, what is worse, misleading in practice. No doubt it will take time to shatter this idol of popular esteem, and a respectable family heirloom like gout, which claims as its victims "more wise men than fools" (Sydenham), is not to be too lightly spoken of.

The three chief nitrogenous constituents of urine are urea, uric acid, and kreatinin.

(1) The origin of urea is almost exclusively endogenous.

(2) Uric acid is partly derived from the food (exogenous), and partly from the body metabolism (endogenous). About 50 per cent. of the endogenous uric acid appears in the urine, the rest is broken up.

(3) Kreatinin (including kreatin) is mainly exogenous in origin, but some is doubtless formed in the body.

If it were not for the sparing solubility of uric acid and of its salts, in virtue of which they become readily visible or palpable, it is certain that we should hear much less of them in pathology, and all troubles attributed to their mechanical agency would, *ipso facto*, vanish. On the other hand, leaving urea out of consideration, we hear nothing at all of the pathological significance of kreatinin, because it is never thrown down in an insoluble form in nature. Yet it contains 37 per cent. of nitrogen, nearly 4 per cent. more than uric acid, and its daily excretion ranks as equal to, if not greater than, that of uric acid, viz., 0·5 to 1 gram. Supposing that kreatinin, whether of endogenous or exogenous origin, was familiar to us as a precipitate, and if there were any simple means of estimating its amount, and the ratio of its exogenous and endogenous excretion, I am sure that we should speedily have a copious literature, and all sorts of plausible hypotheses would crystallise into existence.

Let us now look more closely at uric acid itself, for surely

the most promising road to an improved therapeutics of gout lies through a fuller and more accurate knowledge of the chemistry and physiological reactions of uric acid and the urates (Roberts). When uric acid was first isolated by Scheele in 1776, its chemical position was ill understood. If it had so happened that it was a recent discovery, it might possibly have been baptised by some indifferent name, just as we say leucin instead of amido-caproic acid. Most people know now that uric acid is a member of a group of substances which are commonly termed, after Emil Fischer, the purin bodies, because they are all built upon a fundamental nucleus called *purin*, $C_5N_4H_4$. By some writers these bodies are styled alloxur bodies (or bases), or xanthin bodies. Kossel was the first to establish the close chemical connection between nucleins and the xanthin or purin bodies. The purin compounds of ordinary occurrence are hypoxanthin, xanthin, uric acid, caffein, and theobromin, with some others of less note. In some of these compounds the acidic character, in others, the basic character, predominates, and some are amphoterous in reaction. It would simplify matters considerably if physiologists and pathologists could be induced to recognise, and to teach that uric acid behaves essentially as a weak *monobasic acid*, instead of the usual statement that it is a dibasic acid. Remsen (*Organic Chemistry*, 1889, p. 204) calls it a monobasic acid, but his good example is not generally followed. So far as human physiology and pathology are concerned, it *never behaves otherwise* than as a monobasic acid, and the so-called *acid urates* are the only salts which have any interest for us. They should be simply styled urates. How stand the chemical facts?

(1) The empirical formula of uric acid is $C_5H_4N_4O_3$. It has been shown that, under special conditions, all four atoms of hydrogen are replaceable by basic radicals, *i.e.*, uric acid is potentially tetrabasic. The existence of the compound $C_5K_2(CH_3)_2N_4O_3$ demonstrates this (Wade, *Organic Chem.*, 1898, p. 199).

(2) In presence of an excess of caustic alkali, two atoms, not more, of H can be replaced by metals. By this means, and this only, can we artificially prepare the so-called normal (neutral) urate. They never have been, and, I firmly believe,

never will be proved to exist in the human body, which represents a feebly alkaline medium, rich in carbonates.

(3) The ordinary urates are typified by sodium urate $NaU\bar{r}$ ($\bar{U}r = C_5H_3N_4O_3$). In the notation commonly used, this urate is written $NaH\bar{U}$ ($\bar{U} = C_5H_2N_4O_3$). The former mode of representation is simpler and more consonant with clinical facts. Uric acid in saturated watery solution is only slightly dissociated, *i.e.*, furnishes very few H ions. Its dissociation value amounts to only 9·5 per cent. (His and Paul). This corresponds to a limited ionic dissociation of one atom of H, and the negative acid residue functions as a weak monobasic acid. The ions are, $H^{\cdot}$ and $(C_5H_3N_4O_3)'$. So feeble is its acidity that even a warm aqueous solution scarcely reddens blue litmus, or decolourises reddened phenolphthalein, and a solution of acid urate of sodium turns red litmus blue. The acidity of uric acid is about $\frac{1}{12}$th that of acetic acid (Cohen, *Physical Chem.*, 1903, p. 252). The determination of the solubility of uric acid and its salts in water, and the influence of other substances upon their solubility are of prime importance. That the problem is more difficult than might at first sight appear is apparent from the extraordinary discrepancies in the data published by various authorities. Thus, Prout and Mitscherlich placed the solubility of uric acid, in the cold, as 1 in 10,000 parts of water. Henry, as 1 in 1,720, and Nicolaier, as 1 in 6,000 at 18° C. Dr. W. His, jun., and T. Paul have investigated this problem in a very thorough and exact manner, making use of the recent methods of physical chemistry. For details of procedure, and for the theoretical discussion, I must refer to their admirable papers in the *Zeitschr. f. physiolog. Chemie*, Bd. XXXI., 1 and 64; and also to Höber, *Physikal. Chemie der Zellen und der Gewebe*, 1902. One or two only of their conclusions may be quoted.

Solubility.—The degree of solubility of pure uric acid in carefully purified water at 18° is almost exactly 1 part in 40,000, a much lower estimate than any hitherto given. This is equivalent to saying that in one litre of the saturated solution there is 0·0253 gram of uric acid; or, if preferred, one molecule (168·2 gram) of uric acid in 6,640 litres of saturated solution.

Decomposition.—His and Paul confirm the older statements that uric acid undergoes gradual decomposition by contact with water, especially as the temperature rises. In consequence thereof its solubility increases. Its electrical conductivity also becomes greater, pointing to an increase in the number of ions. The precise changes are not known with certainty, but it is probable that uric acid is partially converted into urea and dialuric acid, $C_5 H_4 N_2 O_4 = CO \begin{matrix} NHCO \\ NHCO \end{matrix} CHOH$.

Effect of other Acids.—Widely different data may be found in physiological literature upon the influence which the addition of HCl has upon the solubility of uric acid in water. While Rüdel and Smale assume that such an addition increases the solubility, Zabelin states that it has no effect. (Cohen, *Physical Chem.*, 1903, p. 249.) But, from the principles of physical chemistry, and from Guldberg and Waage's law of mass-action, it can be foreseen what will happen when HCl is added to a saturated solution of uric acid. For it is undoubtedly true that the addition of a strongly dissociated acid, such as HCl or H_2SO_4, must *decrease* the solubility of uric acid in water, and His and Paul have proved this experimentally.

Urate of sodium, the ordinary gouty deposit in the tissues. This salt is not decomposed by boiling water. His and Paul have determined its solubility to be such that one litre of water at 18° C. contains only 0·004355 of a gram-molecule (208 grams) of the salt. At a temperature of 37·6° (100° F.), Roberts states that the solubility of sodium urate is approximately 1 in 1000. Observe now that, just as the addition of a little HCl (*i.e.*, hydrogen ions) depresses the solubility of free uric acid, so surely will the addition of any extra *sodium* ions lower the solubility of sodium urate by diminishing its dissociation.

This fact is of great practical importance for two reasons: (*a*) On account of the sodium content (NaCl and $NaHCO_3$) of the serum from which the uratic deposits of gout are thrown down. The amount of NaCl in the blood is sufficient to reduce the solubility of acid sodium urate to less than one-tenth of its proper solubility in water; (*b*) on account of the common therapeutic practice of administering alkalies in

the treatment of gout. Physical chemistry teaches us that the administration of an alkaline sodium salt, *e.g.*, $NaHCO_3$, will have precisely the opposite effect to that intended, for, instead of increasing, it will lower the solubility of the salt. So that alkaline (sodium) treatment of gout is not only useless but may actually be harmful. Sir W. Roberts arrived at similar conclusions long ago (*Croonian Lect.*, p. 78), and it is very satisfactory to find his acute inferences confirmed by the revelations of physical chemistry, a branch of science unborn in his time.

If, then, it can be really shown that such alkaline mineral waters as Neuenahr, Vichy, and Contrexéville have a beneficial action in gouty conditions, we must seek for an explanation other than that usually given. But it is well to note that the therapeutics of gravel (calculus) differs essentially from that of gout.

In gout, the error occurs on *this* side of the kidneys, in the blood and tissues; in gravel (calculus), the error occurs on *that* side of the kidney (Roberts). Neither Garrod nor Roberts could recall a single instance in which a paroxysm of gout and a paroxysm of uric acid gravel broke out synchronously. The above considerations apply with added force in regard to attempts to dissolve renal calculi by alkaline remedies. The physician may strive to *prevent* the formation of calculi, but only the surgeon can remove them. It would be wearisome to bring forward analogous reasons for rejecting as futile other remedies such as lithium salts, piperazin, *et hoc genus omne*, in the treatment of gout. As Osler (p. 417) pithily puts it, "Much of the humbuggery in the profession still lingers about mineral waters, more particularly about the so-called lithia waters." The compounds, which piperazin forms with uric acid in aqueous solution, behave like urates.

It can scarcely be maintained that the treatment of gout on the old lines is satisfactory.

Last year Prof. von Noorden, of Frankfort, who is a skilled physiological chemist, as well as a trained and rational clinical observer, opened a discussion at the meeting of the B.M.A. upon the chemical pathology of gout (*Brit. Med. Journal*, September 24, 1904), and in the *Brit. Med. Journal* for

January 21, 1905, Dr. Chalmers Watson, in a luminous paper advanced weighty, and to my mind convincing, reasons for abandoning the uric acid theory of gout. The difficulties connected with this theory may be arranged under these heads : –

(1) Estimation of uric acid.
(2) Pathological occurrence of uric acid.
(3) Experiments on the toxicity of uric acid.
(4) Pathological investigation of gout in man and in the lower animals.

(1) *Estimation of Uric Acid.*—Quantitative determinations of the minute amount of uric acid which normally occurs in blood are difficult; and, even in the urine, they are not very easy to carry out; at any rate, clinically. The limits of excretion of uric acid in gouty and non-gouty people are much the same, and the uric acid content of the blood does not vary in a typical manner with the phases of gout (von Noorden). It is, of course, understood that uric acid never occurs *free* in the blood. Probably it circulates in the form of quadriurate (Roberts).

(2) *Pathological Occurrence of Uric Acid.*—Uric acid has been demonstrated to exist in the blood in weighable quantity in a number of diseased states which have no known relationship to gout (Watson), *e.g.*, chronic Bright's disease, malignant disease, aneurism, lobar pneumonia, &c. It is also well known that in leukæmia uric acid may be present in the blood to a larger extent than occurs even in aggravated cases of gout, and yet we find no uratic deposits, or other evidence of gout. Dr. Chalmers Watson and others have clearly shown that in gout there is no marked disturbance in the uric acid elimination before, during, or after, the paroxysm. Von Noorden has proved that, on a *constant diet*, gouty people are liable to sudden and considerable fluctuations of uric acid excretion. It is important to note that gouty deposits are found almost exclusively in structures belonging to the connective tissue class, and are conspicuously absent from muscle, nerve-tissue, liver, spleen, and lungs. And Roberts (*loc. cit.*, p. 103) shows that the tissues which are liable to uratic deposits are much richer in sodium salts than the tissues and organs which are not thus liable. Hence, on principles already alluded to, sodium urate would be more prone to precipitate in such localities.

(3) *Toxicity of Uric Acid.*—If we believed popular medical, to say nothing of lay, opinion, uric acid is a virulent, all-penetrating poison. Yet it is a normal constituent of our body, and Dr. Watson has proved that, contrary to other assertions, it is regularly found in the blood of birds. Direct experiments upon man and animals do not support the theory of its vicious action, and Sollmann (*Text-book of Pharmacology*, 1901, p. 183), in discussing the physiological action of the caffein group, states that "uric acid shows itself absolutely inactive," save for some local irritation; whereas large doses of kreatin and kreatinin cause headache, nervousness, and slowing of the heart. Sir W. Roberts also entirely disbelieves in the poisonous action of uric acid, a physiological homologue of urea, which is certainly not poisonous.

I have already alluded to leukæmia, in which disease as much as 5 grm. of uric acid may be excreted per day, and Dr. Gore has rightly pointed out that uric acid can be no exception to the general law, that a substance acts as a poison in direct proportion to the amount of it present in the circulating fluids.

(4) *Pathological Histology of Uric Acid.*—Dr. Watson has carefully investigated the histological appearances of gout in the lower animals and in man. He points out that the appearances observed in the tissues warrant the statement that we have no more right to assign etiological significance to uric acid than to other substances of an unknown nature, found in the structureless material left after removal of the crystals. The erosion of cartilage was due, not to the presence of uric acid, but to the phagocytic action of small round cells of the granulation-tissue type. He considers that the pathological portrait is strikingly similar to that seen in chronic infective diseases. Uric acid is merely the feature which gives gouty inflammation its specific character. It is highly interesting to remember that Roberts (*loc. cit.*, p. 105) has demonstrated that a counterfeit gouty joint can be produced in the articulation of a dead animal (pig). After a few days the articular ends of the bones were found to be encrusted with a chalky matter, which could not be wiped off with a towel, or removed with a nail-brush. They presented an exquisite imitation of the plastered appearance of gouty

cartilage. Microscopical sections revealed a dense felt of fine needles of sodium urate in the substance of the cartilage, close beneath the synovial surface.

Working on the same lines as Dr. Watson, Dr. Woods Hutchinson has formulated a more rational and comprehensive theory of gout than that which has so long prevailed.

Dr. Hutchinson defines gout as a toxæmia of gastro-intestinal origin, accompanied by the formation of an excess of urates. This excess of urates is due to the breaking down of the leucocytes and fixed cells in the attempt to neutralise the poison ; in other words, it is the measure of the resisting power of the tissues. The formation and introduction of the toxins are by no means confined to the gouty ; it is only the nature of the resistance of the body to them that gives the character of gout.

The sum of the whole matter, then, amounts to this. Let us plead for a wider and more catholic conception of gout than that popularly accepted ; let us cease to focus our mental lens too exclusively upon a single factor ; let us frankly acknowledge our ignorance of the true pathology of gout, and confess, with Roberts and von Noorden, that, in respect of dietetics, when we enjoin our patients to take freely such foods as milk, cream, and cheese, which are almost free from purin bodies, and to be sparing of food which contains an excess of purin bodies (*e.g.*, meats, thymus, pancreas), we embody almost all there is to be said.[1]

[1] Of vegetables, oatmeal, peas, haricot beans, and lentils, contain the largest amounts of purin bodies. White bread, potatoes, rice, cabbage, and onions contain very small quantities. (*The Purin Bodies of Food Stuffs.* Walker Hall, 1903, p. 46.)

PHYSIOLOGICAL ACTION OF TEA AS A BEVERAGE.

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In the course of ages, experience has taught mankind many useful things whose utility science can even now with difficulty explain. One of these things is the use of certain vegetable infusions as beverages. One reason for using such infusions probably is, that experience has shown that boiled water is less harmful than water fresh from the well in places where the water supply is bad. In the middle ages, whenever an epidemic disease appeared, the cry was raised, "the wells are poisoned," and forthwith the populace proceeded to slaughter the Jews, on whom they laid the blame. In one particular the populace were right. They had noticed that those who drank from certain wells died, whilst those who drank from others escaped. They inferred that some of the wells were poisoned, and their inference was correct. But they were wrong in supposing that either the Jews or any one else had deliberately dropped arsenic, or any known poison, into the water. The wells were poisoned by the unsuspected filtration into them of sewage containing microbes, those living germs of disease whose very existence was unknown until a few decades ago. Science has shown that boiling the water containing these disease-germs destroys its noxious properties, because the germs are killed by the heat. But experience taught people the same truth ages ago, and they acted upon it, although they did not know the reason why. I had often heard of the wide prevalence, in Russia, of the custom of drinking tea, but it was only when I crossed the great plain between Warsaw and Moscow that the reason occurred to me. The water drunk in this plain is, I believe, drawn from shallow wells containing surface water, easily liable to contamination, and probably disagreeable in taste from organic matter, even when not dangerous. At every railway station the tea-urn or "samovar" is to be seen, and the people drink abundantly of tea. But it would hardly be called by that name in this country. It is simply hot water, scarcely coloured and barely flavoured with tea. In Moscow I dined with a

scientific man, and, after dinner, the samovar was placed on the table, and tea handed round. I asked my hostess how much tea she used, and she replied, "I am extravagant in tea, we are twelve at dinner, and I put in four teaspoonfuls, but most people would not put in so much." Here, I thought, is a difference from our rule of one teaspoonful for each person and one for the pot, and a reason why tea can be drunk to such a large extent in Russia without doing harm. As a contrast to this, I may describe what I saw in a herring boat at Whitby. I had gone out to spend the night in the boat and see the catch of herrings. We had not been long on board when the master, knowing I was a medical man, complained to me of his sufferings from indigestion. I did not understand why a sailor living a healthy open-air life should suffer in this way, but in a very short time the reason became evident. They made some tea and offered me a cup. But, instead of being a pale straw colour, and having a hardly perceptible flavour, as in Russia, it was as black as ink, and had a strong, bitter, and astringent taste. Judging from its appearance, I should think that tea had been put into the pot, not by the spoonful, but by the handful. A single cup was enough to cause much gastric discomfort, and several cupfuls every day were sufficient to produce any amount of dyspepsia. In other countries, where water is bad, as in Australia and South Africa, the practice of tea drinking is very prevalent.

But experience has shown mankind that the avoidance of danger from impure water is not the only advantage to be gained by drinking vegetable infusions. Safety might be obtained by simply boiling the water, but boiled water has an insipid taste, which is removed by adding to it various plants. Many have been tried, especially those having an aromatic smell, such as peppermint, &c. To a palate entirely unaccustomed to infusions, the taste of peppermint, perhaps, might be more agreeable than that of tea, but it lacks the other property which tea possesses, namely, that of stimulating. It is very important that we should understand clearly what we mean by stimulating, and that we should distinguish clearly between foods and stimulants.

Food is something which actually supplies energy to the body, in much the same way as coal supplies energy

to a steam engine. A stimulant supplies little or no energy, but enables a man to draw on his reserve stock in a way that he could not do without it. A stimulant, in fact, plays the same part in the operations of the body that bills do in the operations of commerce. In addition to his available capital, which he can use at short notice for commercial purposes, a man usually has some reserve capital which he cannot realise at once, so as to utilise it at short notice, when sudden demands are made upon him. If he cannot draw upon this reserve capital, he may become bankrupt for want of the power to utilise it. By means of bills he may borrow from this reserve, tide over a difficulty, save himself from bankruptcy, and accomplish transactions which he could not manage without them. But, if bills are too freely used, and reserve capital is too largely drawn upon, a man's bankruptcy, though postponed, is all the more disastrous. In the same way, stimulants enable us to draw upon our physiological capital, and to bring to bear upon a certain piece of work powers of body and mind, which we could not exert without their aid, and by this means we may be able to accomplish feats, bodily or mental, which would otherwise be beyond our power. But if stimulants are used too freely, all the reserves of energy, bodily or mental, will be used up to too great an extent, physiological bankruptcy will set in, and the wreck of body and mind that will ensue will be complete and deplorable.

Stimuli may be mental or physical. Amongst the most powerful of the former are love, pride, and ambition. These are not confined to man, but act upon the lower animals also. Once when racing along a road with a friend who was mounted on a horse while I was mounted on a pony, the pony's ambition enabled him for a while to keep pace with the horse, but as the longer stride of the latter began to tell, and he gradually forged ahead, the pony bit at him savagely in an attempt to hold him back and prevent him from winning the race. I have no doubt that the pony would gladly have welcomed whip or spur, or both, if the stimulus they supplied, however painful, had enabled him to win. In the struggle for existence amongst men, competition is very keen, and they naturally welcome stimulants which will enable them to do more than

they otherwise could. The use of stimulants is almost universal throughout the world. In countries where the vine grows, wine is largely used. In colder countries, where there are no vines, fermented liquors, or spirits distilled from them, are employed, and in a large portion of the world's area other plants, which have a strong action upon the nervous system, are preferred even to alcohol. Over a large part of India, opium is used, and to a less extent cannabis indica, but in many other countries various infusions are employed which act as stimulants without producing either stupor, like opium or alcohol, or mental disturbance like haschisch. The fungi used in Kamschatka and the betel nut in India probably act on the circulation like tobacco, but tea in China, coffee in Arabia, guarana in Brazil, maté in Paraguay, and cacao, or, as it is more commonly called, cocoa, in Central America and the West India Islands, all contain active principles very closely allied to one another, chemically and physiologically. The coca of Peru contains an active principle not so closely related chemically to tea as these others, but physiologically it also resembles tea in many respects, though differing from it in others. Many millions of experiments, lasting on through countless ages, must have been tried by mankind with infusions of leaves of various kinds, and it must have been some useful property which has led men to select from amongst them leaves so different in kind and coming from such different plants as those which I have just mentioned, but all of which have a similar effect upon the human organism. The effect which they do produce is purely that of a stimulant, as I have already described it. They enable a man to draw upon his reserves, mental and bodily, to an extent which he could not otherwise do, and give him greater mental or bodily power to meet any sudden demands, to overcome a difficulty, or to continue exertion long after he would have succumbed to fatigue without their aid.

In order to understand how these stimulants act, it may be necessary to make another physiological digression, and discuss the subject of fatigue.

One important function of the brain is to preserve the body from harm. If the hand touches a piece of hot iron the painful impression is at once carried by the nerves up to

the brain, and the hand is drawn away before much injury is done. If the brain were narcotised by opium, alcohol, or chloroform, no pain would be felt, the hand would not be withdrawn from contact with the iron, and it might thus become so severely burned as to be utterly useless. It is the quick appreciation by the brain of danger from without that thus protects the organism. In the same way it also protects the organism from dangers arising within it. The organs of the body are rarely worked to their full extent, but are kept well within those limits which it might cause serious injury to overstep. Thus it is that ordinarily when persons are undergoing violent exertion involving the hands or feet, the limbs or body, they are obliged by pain to relax the muscles before they break under the strain to which they are subjected, and the oppression on the chest and the pain in the heart, which violent exertion brings on, usually compel the individual to lessen it, or cease it altogether, before the heart has become injured. In the same way long-continued exertion causes fatigue in the muscles which is perceived by the brain, and the person is forced to rest long before his muscles are completely exhausted. Powerful mental stimuli, such as the desire to save oneself from imminent danger or death, or even ambition to win a race, may lead men to strain their muscles until they snap, or their hearts until they stop. But short of such serious results, powerful exciting stimuli may lead men to accomplish feats, of which they would have believed themselves incapable, and which, in truth, they could not have accomplished except under the influence of excitement. The same rule appears to hold good in regard to mental exertion, and most men are capable of a great deal more mental work than they actually perform. Here, again, the weariness, which mental work brings on, appears to be a safeguard, and not unfrequently one finds that people who have, during periods of excitement in which fatigue was not felt, overworked their brains for months together, fall into a condition of neurasthenia from which it is very hard to recover.

The effect of tea, coffee or cocoa appears to be three-fold, (1) on the circulation, (2) on the spinal cord, and (3) on the brain. Through the effect of these substances on the circulation, the flow of blood through the brain is increased, more

nutriment is supplied to the brain cells, and thus thought is quickened. The brain cells themselves are also probably affected by tea or coffee so that communication between them becomes more rapid, more complete, and more permanent than in ordinary circumstances, and thus it is that people think more clearly and speak more readily when stimulated by tea or coffee. On the other hand, these substances tend to keep up mental action when it is not wanted and prevent the sleep which ought to come on after exertion, and which is needed to restore the tired brain. But perhaps the most remarkable action which they have is that pointed out by Bennett and McKendrick,[1] viz., that they lessen or abolish the transmission of sensory impressions both in the peripheral nerves and the spinal cord, and thus interfere with the conduction of painful impressions to the brain. Amongst other disagreeable sensations they lessen the sense of fatigue. They thus give a sense of well-being and of power, which is very agreeable, and not only do they give the feeling of power but they actually enable men to do more and to endure longer than they otherwise could. In Peru the Indians are accustomed to chew coca leaves on long journeys. These leaves contain no nourishment, and yield no energy to the body, but they prevent a person from feeling the sense of fatigue and enable him to draw upon his reserve energy until his course is finished when he may again rest, take food, and replace the energy he has expended. The qualities of tea are well put in one of the Sloane Manuscripts, dated 1686, and quoted by Dr. Tebb in his excellent paper on "Tea, and Tea Drinking."[2] It was said "to purify the blood and kidneys, cure giddiness and pains in the head, vanquish superfluous sleep and heavy dreams, open obstructions, clear the sight, strengthen the memory, sharpen the wits and quicken the understanding." No wonder with such excellent qualities that the "cup which cheers, but not inebriates," should have become such a universal favourite, and if properly used it certainly is a great boon to mankind.

Unfortunately tea is liable to abuse as well as use, and just as the bills, which properly employed may greatly help a

[1] A. Bennett and J McKendrick: *Edinburgh Med. Journ.*, October, 1873.

[2] *Tea, and the Effects of Tea Drinking.* By W. Scott Tebb, M.A., M.D., D P.H. London: Cornell and Sons, 63, Borough Road, London, S.E.

commercial man, will bring about hopeless bankruptcy if over drawn, so tea and its congeners, if abused, will bring about the most disastrous results. One of these is a consequence of the power of tea to lessen disagreeable sensations, for it not only lessens fatigue but it lessens hunger as well, and thus tends to prevent nutriment being taken which would otherwise build up the organism, and restore the energy taken from it by exertion under the influence of tea. All teas, however good, have this action, but in addition to it some teas have an injurious effect upon the stomach itself on account of the tannin which they contain. Tannin when taken along with butcher's meat hardens it and renders it less digestible, so that a meat-tea is often provocative of dyspepsia. Upon farinaceous food it has no such action, and the experience of people has shown that bread and butter, toast or rusks, go well with tea. Fish and eggs are, I think, softer than meat and do not suffer so much from the tanning action of the tea, whilst bacon is already hard and remains unaffected. But it is not only upon the food that tannin exerts its injurious action. It affects the mucous membrane of the stomach itself and lessens its digestive power. The different kinds of tea vary in the amount of tannin they contain, and according to Dr. Tebb[1] it is somewhat less in China tea than in India and Ceylon teas. It depends, perhaps, even more on the mode of preparing the tea than upon the tea itself. When boiling water is simply poured on the leaves, and is again poured off after standing for a few minutes, only a small proportion of tannin is extracted, but when the leaves are boiled or stewed a great deal of tannin is dissolved out, and is apt to produce severe dyspepsia.

It is thus evident that tea may interfere with nutrition in three ways. First, by lessening the feeling of hunger, second, by rendering food less digestible, and third, by interfering with the digestive power of the stomach. At the same time that it thus lessens the nutrition of the body, it enables the person to use up much more energy than he or she would be able to do without its aid, and the consequences of this are most evident in regard to the nervous system. Although tea prevents the

[1] Tebb: *Op. cit.*

sensation of fatigue from being felt for a while, yet exhaustion is going on, both in mind and body, and this usually at length causes disinclination either to mental or bodily exertion, and tends to destroy the power of doing any useful work, either mental or bodily, even when the attempt is made. Power of self-restraint is diminished and the person becomes nervous, unduly sensitive, timid, and emotional. Not unfrequently ringing in the ears is felt, giddiness, headache, sometimes very severe neuralgia and tremulousness. The tremors seem to be more readily induced by green tea than by black tea, and I have known of one case in which two or three cups of green tea were sufficient to induce marked tremor. An officer in the army, who was suffering from severe neuralgia, and who, though moderate in alcohol, took too much tea and tobacco, once consulted me. I cut off his tobacco and alcohol, but allowed him to go on with his tea. The neuralgia continued, and he consulted another medical man, who promptly cut off the tea as well with the satisfactory result that the patient quickly recovered. Neuralgia is very apt to occur in nervous people who are able ordinarily to take a great deal out of themselves, either by sheer force of will or under excitement, and are thus more liable to reduce themselves below normal than those of more lymphatic temperament. Neuralgia has been described as the prayer of a nerve for better blood and more of it, and if this is true, as I believe it to be, one can easily see how tea, by enabling these people to take even more out of themselves than they otherwise could, will render their neuralgia more severe and more continuous. It is evident that a similar result is to be expected in regard to other nervous functions, and that the stability of the brain may be so seriously impaired that the combination of starvation and stimulation, produced by excessive tea drinking, will certainly produce a tendency to mental derangement, even if it does not actually determine its onset.

But, in addition to its action on the nervous system, tea is a powerful stimulant to the circulation, and, if abused, will tend to weaken this, just as it tends to weaken the nervous system, and will lead to feebleness of the pulse and palpitations.

All teas are not equally injurious. Ceylon and Indian

tea are preferred by many people to China tea on account of their aroma and stimulating qualities, and, so long as they are taken in moderation and prepared in the right way by simple infusion for two or three minutes, and then pouring the water off from the leaves, they will suit healthy people very well. But whether it is on account of the higher proportion of tannin they contain, or some other reason which we do not yet know, they are not so good for weak digestions as China tea, which, especially if it is prepared in the way just recommended, by infusion for two or three minutes only, is less likely to cause dyspepsia than other kinds of tea.

The taste of tea is much affected by the nature of the water in which the leaves are infused. Hard water and water containing iron do not make good tea, and the chalybeate water is apt to make a very dark infusion from the tannin of the tea reacting on the iron in the water and producing ink. Water in which the hardness is "temporary," depending on the presence of calcium carbonate, may be softened by boiling, which drives off the carbonic acid gas, and thus precipitates the calcium carbonate which it keeps in solution in the water. But water from which the gases have been driven off is insipid, and water which has been boiled twice, so that all the gases it would usually contain have been removed, does not make good tea. In places where the soil is chalk and limestone, and the water is consequently hard, it is better to make tea with boiled soda-water, Apollinaris, Salutaris, or some other effervescent water free from lime. This procedure tends also to lessen the constipation which the hard water is apt to produce.

Where these waters cannot be had, a pinch of bicarbonate of soda into the tea-pot improves the infusion.

The physiological action of tea is usually attributed almost entirely to the alkaloid, theine or caffeine, which it contains, but I do not think that this can be the case because green tea, which contains no more alkaloid than black tea, has a much more powerful effect upon the nervous system, an effect which cannot be explained by the somewhat larger proportion of tannin, and must, I think, be due to some other constituents in the leaf. Green tea and black tea are not obtained, as many

people suppose, from different varieties of the plant, but only differ in their method of preparation; the leaves which form the green tea being roasted in a pan shortly after they are plucked, while those that form black tea are allowed to undergo a form of fermentation before roasting.

To sum up shortly what I have said in this paper. Tea, when properly prepared, and taken in moderation, is both useful and agreeable. When taken in too great quantity, or along with butcher's meat, when too strong, when infused too long, or still more when boiled and stewed, it is apt to produce digestive troubles. When taken in excess it may produce nervous symptoms of the most serious character, and facilitate, if it does not actually produce, mental degeneration.

THE PRESENT POSITION OF DIETETICS.

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THE beginning of a new year seems to be a suitable time at which to review the present position of our knowledge in any branch of Medical Science, to glance back over the progress which has been made, and to attempt to forecast the lines along which development is likely to take place in the future. Especially is this the case in such a subject as Dietetics, which, after stagnating for a time, has recently made great advances, and some of the hitherto accepted axioms of which have in the course of the past year been brought into question in a way to be described immediately. The subject of diet, too, is at present very much in the air. Its discussion, along, it is to be feared, with that of many other medical topics, has passed from the academic groves to the market-place, and even to the drawing-room, so much so, indeed, that, as a lay writer has recently remarked, it is necessary nowadays to read a medical journal regularly if one is to be properly equipped for a dinner-party. What one should eat, and when and where and how are matters of anxious debate in the daily press and in popular magazines, and wherever two or three are gathered together, and on such subjects the doctor is naturally expected to speak with authority ; but he, poor man, having received but scanty dogmatic teaching on the subject in his student days, and knowing little of the scientific principles of Dietetics, but much of the complexities and idiosyncrasies of human physiology, and of the dangers of dogmatism, is apt, when appealed to as the *arbiter edendi*, to fall back, in self-defence, upon mere vague generalities, or harmless platitudes.

Now whether this awakened interest of the public in matters of diet be a good thing or a bad—a question on both sides of which there is a good deal to be said—it certainly cannot be right that the medical profession should not be in a position to give clear teaching on the subject. On general principles, at least, we ought to be in accord, and prepared to give a lead when appealed to for guidance, and not to leave our patient at

the mercy of any sciolistic faddist or system-monger whom he may happen to encounter in the club, and if only the principles at the root of the whole subject were grasped, we should at least be able with confidence to meet the amateur dietetician in the gate and to argue with, even if we cannot hope to convince him. For purposes of convenience, "Dietetic reformers" may be divided into two classes—the quantitative and qualitative, the former believing that we eat too much, the latter that we eat the wrong things. Let us try, then, in the first place, to ascertain what physiology has to tell us about the amount of food which is required for the maintenance of health.

In approaching this part of the subject, we must distinguish clearly between the two functions which food fulfils. It has to provide for the conservation of energy in the body and for the conservation of matter; in other words, the income of potential energy in the form of food must balance the expenditure of energy in the form of heat and work, and the daily wear and tear of body-substance must also be replaced.

Of the chemical constituents of the food, it has been abundantly proven by physiologists that the nitrogenous substances, known collectively as *proteids*, are alone capable of replacing the hourly disintegration of tissue; but the proteids, starches, sugars and fats of the diet are all able to act as sources of potential energy. As far as the tissues are concerned, indeed, it would seem, from physiological teaching, to be largely a matter of indifference in which of these forms the energy is supplied; although, it may be remarked in passing—and this is a point often lost sight of by the food reformers—it is by no means a matter of indifference from the point of view of the digestive apparatus. Hence, our original problem, how much food is necessary for the maintenance of health, really resolves itself into two parts—(1) how much total energy, and (2) how much proteid the diet should contain.

(1) Energy is expended in the body in the maintenance of the heat of the blood and in the production of the external work of the muscles, and the even more important internal work of the digestive organs, circulatory and respiratory apparatus, and secretory and excretory glands.

For purposes of measurement, it is convenient to have some standard by which to estimate these different outgoings of energy, and such a standard is found in the unit of the large Calorie, which, it will be remembered, is the amount of heat required to raise the temperature of one kilo. of water by one degree Centigrade. By fairly accurate methods of observation, the details of which need not be entered into here, it has been found that the total quantity of energy expended by a man of average weight, doing a moderate amount of muscular work, is about 3,000 Calories per day, and this must be the sum of the potential energy contained in the food if physiological equilibrium is to be maintained. This total however, must not be taken as quite hard and fast. It varies somewhat with circumstances, in particular with the amount of muscular labour performed. Thus, in the case of men who follow sedentary pursuits, it may fall to 2,500 Calories or less, whereas, if very severe labour has to be performed, it may rise to as high as 4,000 Calories, or even higher. Mental work, on the other hand, does not seem to affect it much; indeed, the expenditure of energy in brain-work cannot be appreciated by physiological methods. Such factors as sex, age, and build are also of great influence. Women require a smaller supply of energy than men, whilst children, owing to the greater activity of their cells and their relatively greater heat loss, require proportionately more than an adult. Stout people require less energy than lean, partly because fat is, comparatively speaking, a dead tissue, which, when once stored up, does not take any active share in metabolism, partly because a round body has, relatively to its bulk, a smaller superficial area, and therefore loses less heat than one which is more or less flat.

Should more potential energy be supplied in the form of food than is used up in the shape of heat and work, one of two things must happen. Either the excess is not utilised but is stored up in the form of adipose tissue, or the surplus is burnt up with the production of superfluous heat. In the former case, the body-weight steadily rises; in the latter, the excretion of carbonic acid and water and the amount of heat given out from the surface are increased. We can detect the rise of body-weight by the balance; but increased combustion in the body we cannot so easily determine. Persons so situated, however,

will stand cold well, heat badly; producing as they do a constant slight surplus of heat, they will be under the necessity of increasing their loss when exposed to even slight rises of temperature. In other words, they will sweat easily.

A surplus of food, which is habitually stored up in the form of fat, must ultimately prove harmful, for fat cannot be accumulated in the body indefinitely with impunity. Excess, on the other hand, which it is not beyond the power of the cells to convert into heat, cannot be proved to do harm, for the end-products of its combustion, carbonic acid and water, are readily eliminated and cannot accumulate and act as poisons. The only trustworthy evidence, therefore, that too much food is being taken, is a steady rise in weight after the period of full growth and development has been completed. At what point, however, such a rise in weight becomes harmful is not, *pace* the food reformers, an easy matter to determine. Each individual has what is sometimes called his "fighting weight," *i.e.*, a degree of muscular and adipose development at which his health and efficiency are at a maximum. What this weight is it is impossible to predict off-hand in any given case; it can only be found out by experiment, and the sensations of the individual concerned as to "fitness" are its final criterion. Of the consequences of an habitually too small supply of energy in the food, we as medical men can speak with greater certainty, for we have many experiments made by disease to instruct us. Take, for example, the case of a patient with severe diabetes, one half of whose total intake of energy runs out through his kidneys unutilised in the form of sugar. Such an one loses weight, he complains of great lassitude and unfitness for effort, and he exhibits an habitually subnormal temperature. To the latter point, I believe, sufficient attention has not been directed. A subnormal temperature does not mean that the patient has ceased to be a warm-blooded animal, but it does mean that his body-heat is adjusted to a point below that of health. An individual so situated, if suddenly exposed to cold, cannot regulate his temperature by the chemical means of producing more heat, for he has no reserves in hand, but is obliged to have recourse solely to economising his heat-loss by contraction of the surface arterioles,—a method which, when carried to excess, results in internal congestions and inflammations.

This, then, we can say, that whereas, on the one hand, the habitual consumption of an amount of food which, though perhaps greater than is required to maintain the individual at his "fighting weight," is yet not beyond the power of the cells to oxidise completely, and which therefore does not result in the steady deposition of fat in the tissues, cannot be shown to be harmful, the consumption of food which contains less energy than is required to maintain the temperature of the body at its normal level undoubtedly exposes the individual to grave risks of sudden disaster. To use a French phrase, "Pour avoir assez il faut avoir trop"; a somewhat superabundant diet is less risky than one which is too Spartan, and those, who would accuse the bulk of civilised mankind of a too liberal consumption of food, must take care lest they end by causing more disease than they prevent.

(2) When we pass to the second division of our problem, the amount of proteid required daily to maintain the body in a state of health and efficiency, we are on more treacherous ground. The teaching of physiology on this point has never been quite satisfactory, for any experimental solution of the problem is beset with great difficulty. It will not do simply to estimate the amount of nitrogen excreted by a healthy man daily, and to calculate from this the quantity of proteid required in the food, for the simple reason that "nitrogenous equilibrium," as physiologists call it, can be established on varying quantities of proteid. The real question at issue is really not upon how much or how little proteid equilibrium can be established, but what is the proteid *optimum*—the best quantity for us to consume. Despairing of any experimental solution of this question, physiologists have fallen back upon empirical observation, and have assumed that the amount of proteid voluntarily consumed by the majority of healthy individuals living on a freely selected dietary is probably the correct amount. Proceeding in this way, Voit long ago arrived at the figure of 118 grammes (about 4 ozs.) as the necessary daily amount of proteid to be consumed by an "average" man, and this conclusion has been accepted by most physiologists and made the basis of calculation in dietary standards. Obviously one's faith in this standard will vary with one's belief in the instinctive wisdom of mankind. If the average man can be trusted to

discover by instinct what is good for him, or if we believe that in the struggle for existence such knowledge has been unconsciously acquired by the accumulated experience of the race, then the Voit standard is deserving of acceptance. Hitherto most students of dietetics have been prepared to pin their faith to Voit's standard—not, however, without certain misgivings in some cases. Uncomfortable exceptions were always cropping up. The experience of vegetarian races, for example, was difficult to reconcile with Voit's view, for analysis of their diets did not always show the presence of the 118 grammes of proteid believed to be necessary, and the same was true of the diets of many "sporadic" vegetarians in this country and elsewhere. No organised attack on the orthodox standard was made, however, until in recent times Professor Chittenden, of Yale, inspired by a distrust of popular wisdom, and believing that man, being a greedy animal, is just as likely to eat too much of any foodstuff as to have hit upon the optimum, submitted the whole matter to careful experimental test. He accordingly went himself and put groups of healthy men living active lives upon a diet which contained less than half—sometimes only about one-third—of the orthodox quantity of proteid. His observations were very thorough, for they extended over a period of many months, and they showed that not only was the nitrogenous equilibrium maintained upon the new standard, but that its adoption was attended by a degree of health and efficiency higher than the normal, and further that this result was attained without any increase, nay, in some cases even with a diminution, of the total energy value of the diet. The kernel of this new view would seem to be, that the best quantity of proteid for the diet to contain is the bare amount necessary to repair the daily waste of tissue in the body, or, in other words, that the real proteid optimum is the minimum upon which nitrogenous equilibrium can be maintained.

The older physiologists believed that proteid should be used, not merely to replace waste of tissue, but to some extent as a source of energy as well, and they taught that there was an advantage in so doing, for that proteid was a stimulant to the cells and increased their vitality and powers of resisting hostile influences. Against these rather problematical advantages, Chittenden would set the undoubted fact that the

consumption of a minimum of proteid is a source of great physiological economy in the body, lessening, as it does, the work of the liver in elaborating the end-products of proteid metabolism, and the labour of the kidneys in disposing of nitrogenous waste. From a medical point of view, too, there can be no doubt that such a course would greatly lessen the incidence of those diseases which are due to the accumulation in the body of imperfectly oxidised proteid, and indeed Chittenden considers that, by its adoption, gout in its various manifestations could be altogether abolished.

Time alone can show whether this would be so or not, and whether the fears of the older physiologists, that life upon a proteid minimum would mean a lowered resistance to disease, are well founded. Meanwhile, the attitude of the medical profession to the new views should be one of caution. Seeing so much of disease as we do, we can never forget that, though some of it may be caused by an excessive consumption of proteid, yet a diet which is too poor in nitrogen also has its victims. We must all have seen anæmia and debility result from a diet, which, either from necessity or choice, has been lacking in animal constituents. Above all, we must oppose any attempts greatly to restrict the consumption of proteid food by the young, for growth and development can only proceed to their fullest limits if the nitrogenous materials out of which the body is built up are liberally supplied.

The abolition of gout and the other diseases, which may result from an unnecessary consumption of proteid, would be dearly bought at the price of a shrinking of the physique of the rising generation.

On the other hand, we may fairly claim the support of these recent experiments in favour of the view, which most of us have long held and pressed upon our patients, that the average adult in this country, especially in the upper classes, eats more meat than there is any necessity for, and sometimes suffers in health in consequence.

We may pass now to consider the position of the second or "qualitative" group of food reformers, those who think that we eat the wrong things. The only members of this group who merit serious attention are those who, on physiological grounds, condemn the use of flesh-foods. The exponents

of this system have, in many cases, become the victims of "uric-acidism"—a curious form of obsession which attributes to uric acid most of the physical evils of the world, and some moral ills as well, and as uric acid is derived, not only from flesh but from all foods which contain the chemical bodies known as "purins," they prohibit to their disciples the use of oatmeal, peas, beans, and lentils, asparagus, onions, and tea and coffee, all of which are potential sources of the "poison."

It may be remarked, in the first place, of this doctrine, that it attaches to uric acid an importance to which it is in no way entitled. That the presence of waste nitrogenous products in the circulation may give rise to symptoms of disease every medical man knows, but simply because uric acid happens to be the most easily identified of such products, it does not follow that it alone is the *materies morbi*. Further, to assert that uric acid is always a "poison" to the human body, is to shut one's eyes to the fact that whole races and innumerable individuals manage to maintain perfect health on a diet which yields uric acid in quite large amounts. One man's poison may be another man's meat, and because some unfortunate individuals are unable to deal adequately with nitrogenous waste products, there is no reason why the free choice of food should be forbidden to the stronger brethren. We should certainly, as a profession, oppose any plan which would limit the range of articles from which a diet can be selected, both on grounds of convenience and for the sake of the digestive organs. One of the superiorities which man exhibits over most other animals is his adaptability in the matter of diet, which has enabled him to go all over the world and to live healthily upon the most diverse forms of food, and any system of diet which would render this adaptability more difficult must be regarded as reactionary in its tendency. The needs of the digestive organs, again, are apt to be forgotten when such systems are propounded. A mixed diet is certainly that which is most easily digested, and many people, particularly dwellers in towns, find the "windy insufficiencies" of a vegetable diet difficult of digestion, nor are the labours of their stomachs much alleviated by the free addition of milk and cheese, as in the lacto-vegetarian plan. In addition to all this, there is every reason to believe that the

benefits, which a purin-free diet is undoubtedly capable of yielding in certain cases of disease, can be obtained just as well by a mixed diet, in which the proteid consumption is kept down to a minimum. Temperance in proteid is the ideal to aim at; and if this be observed, it probably matters but little from what source the proteid is derived.

In conclusion, it is hardly necessary to insist that, in matters of diet, as in most others, we should keep an open mind, and bring to their study that spirit of sanity and humour, that breadth of view and power of criticism, which should always be the distinguishing marks of a liberal and scientific profession.

A REVIEW OF SOME RECENT WORK ON THE SURGERY OF THE STOMACH AND APPENDIX.

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THE STOMACH.

Congenital hypertrophic stenosis of the pylorus in infancy has received much attention during the last few years, and monographs by Clinton Dent, Cautley, Still, Nicol, Rolleston, and others have helped to place the pathology symptoms and treatment of this affection on a sound basis.

An article by Clogg, with a *résumé* of 33 cases, appeared in The Practitioner for November, 1904, and more recently papers have been published on this subject by Scudder, Schmidt, Audry and Savournat, and Still. Still (*Lancet*, March, 1905), in discussing the symptoms and physical signs of this disease, lays especial stress on the character of the vomiting. He points out that this as a rule begins from two to four weeks after birth, is persistent, and forcible. It continues in spite of treatment, and is associated with constipation and wasting. The diagnostic signs are, marked visible peristalsis or the stomach wall, and the presence of a palpable thickening in the region of the pylorus. He advocates, if possible, a non-operative line of treatment, but considers that surgical interference should not be delayed too long. Schmidt (*Münchener Med. Wochenschrift*, 1905, No. 7) discusses the œtiology of the obstruction, and distinguishes between pure hypertrophy and spasm of the pylorus. When true hypertrophy of the pylorus is present, little hope of cure can be expected by any but surgical measures, but the rarer form of true spasm presents a more hopeful field for medical treatment. He considers that pyloric stenosis is frequently due to a combination of spasm and hypertrophy. In discussing the operative treatment, preference is given to either gastro-enterostomy or pyloro-plasty. He believes that pyloro-plasty, so ably advocated by Dent, is, in early cases, the operation *par excellence*, whilst in

the later stages, where secondary dilatation has occurred, gastro-enterostomy will give the best results.

Scudder (*Journ. of American Association*, May 27, 1905) distinguishes two groups—(1) sub-acute or chronic, (2) fulminating. He considers medical treatment to be of little avail. He finds that, since 1898, 50 per cent. of the cases treated by operation recovered. He condemns Loreta's operation, and considers pylorectomy as a rule unjustifiable. Some form of gastro-enterostomy is the best procedure; the anterior method should not be employed, owing to the shortness of the mesentery of the small gut. In certain cases, Finney's operation, or Kocher gastro-jejunostomy, is indicated. The author holds the view that the stenosis is due to a primary congenital hyperplasia, with a superadded spasmodic contraction of the pylorus.

Harper and Harper (*Lancet*, August, 1905) record a typical case of this disease successfully treated without operation. Careful feeding with small quantities of peptonised milk, and the administration of rectal injections of saline fluid twice a day were followed by cure in their case. Reference is made to similar recoveries without operation reported by Batten, Gardner, Ashby, Still, and Goodhart.

The surgical aspects and treatment of gastric ulcer still occupy the attention of many surgeons, and afford material for several recent papers.

Acute symptoms, caused by perforation or hæmorrhage from gastric ulcer in early childhood, are not common. A typical case, with a fatal termination, is recorded by Grainger Bisset (*Lancet*, July 8, 1905). The post-mortem examination disclosed the presence of an acute ulcer near the lesser curvature with implication of a branch of the left superior coronary artery. Morris and Feldmann (*B.M.J.*, February 15, 1905) report an interesting case of hæmatemesis and melæna in an infant two days old, probably due to gastric ulcer. This patient recovered. The rarity of this condition has been pointed out by Fenwick, who refers to Welch's statistics. Only one out of 607 cases occurred in the first decade of life.

Stowell, writing on the same subject (*Med. Record*, July, 1905), describes the case of a girl, eight years old, who died

from perforation of two gastric ulcers. He quotes and gives a short abstract of 35 cases from the literature; the ages of these patients range from 30 hours to 18 years. In only 14 of these cases, were there any symptoms indicative of disease of the stomach wall. In nine patients, ulcers were unexpectedly found in the stomach at the autopsy, death being actually due to other diseases. The symptoms of gastric ulcer in children may be atypical or latent. In a few cases, classical symptoms, such as pain, hæmatemesis, and melæna are present. In others, as in adults, the signs of acute perforation may be the first indication of the trouble. Infants are more likely to die from hæmorrhage than adults. In older children, perforation of the ulcer is more likely to occur than in infants. The author thinks that the general prognosis does not materially depend upon age.

The cause of pain in cases of gastric ulcer is discussed in a paper by Mansell-Moullin (*Lancet*, March 4, 1905). He considers that the intense pain, often associated with gastric ulcer, is due to adhesions formed between the stomach wall and the parietal peritoneum, and that the sensory branches of intercostal nerves are dragged on by the stomach movements, consequent upon these perigastric adhesions. He points out that the actual stomach wall is, for practical purposes, quite insensitive. The pain in gastric ulcer depends, therefore, largely upon the position of the ulcer, its chronicity, and the formation of parietal adhesions. If this be true, division of these adhesions combined with a gastro-jejunostomy should effectually remove the source of pain. He quotes cases in support of this contention. He recommends that the anastomosis should be made near the cardiac end, so as to give the pyloric end complete rest, or, if made near the pylorus, should be large, with free division of the circular fibres.

Moynihan, in a lecture to the London Polyclinic (*B. M. J.*, April 8, 1905), discusses the surgical treatment of gastric ulcer under the following heads :—

(1) Perforation, (2) Hæmorrhage, (3) Chronic Ulcer, (4) Hour-glass Stomach.

He draws attention to a class of cases intermediate between the acute and chronic perforations, for which he suggests the name sub-acute perforating ulcer. He recognises that cases

subacute and chronic, may be temporarily alleviated by medical means. He is convinced that the inevitable formation of peri-gastric adhesions, with their consequent train of symptoms, will ultimately call for surgical interference. He discusses hæmorrhage in gastric ulcer under four heads :—

(1) Latent, concealed, and trivial.

(2) Intermittent, spontaneous, moderate in amount, but causing persistent anæmia.

(3) Abundant bleeding following symptoms of chronic ulcer, tending to recur, and, if untreated, ultimately causing death.

(4) Large fatal hæmorrhage.

Operative interference depends entirely as to whether the hæmorrhage recurs, and does not yield to careful medicinal treatment. The author still holds that, in the majority of cases, a gastro-enterostomy is sufficient, and has not yet seen recurrence of hæmorrhage after this operation. In the treatment of hour-glass stomachs, he performs gastro-plasty, or gastro-enterostomy.

Ochsner (*Canada Lancet*, June, 1905) deals with the surgery of the stomach from the clinical standpoint. He describes in detail the symptoms and consequences of gastric ulcer, and discusses fully their differential diagnosis. Attention is particularly drawn to the "vicious circle" which takes place in the development of the gastric ulcer, the stages of this circle are :—

(1) Severe pain due to the ulcer, without evidence of dilatation of the stomach, or pyloric obstruction.

(2) Obstruction of the pyloric sphincter due either to extension of œdema from the ulcerated area, or cicatricial contraction.

(3) Hypertrophy of the rest of the stomach wall.

(4) State of muscular exhaustion and relaxation, with dilatation as the result.

(5) The lower margin of the greater curvature sags below the pyloric opening, and causes increased difficulty to the passage of the stomach contents.

(6) Accumulation of residual food with decomposition.

(7) The formation of excess of mucus, which hinders the proper digestion of the stomach contents.

(8) Excess of acid secreted to neutralise the excess of mucus, *i.e.*, hyperacidity, tending to increase the area of ulceration.

In the operative treatment of chronic ulcer, he advocates either gastro-enterostomy, or Finney's operation. He points out, in agreement with Mayo, that if the pylorus is patent, the gastro-enterostomy opening is liable to contract; that the ideal operation is pylorectomy, excision of the ulcer, and a lateral anastomosis. He agrees, however, that this procedure adds considerably to the severity of the operation, and does not recommend it in uncomplicated cases. Ochsner prefers the posterior route of gastro-enterostomy, and does not, as a a rule, use the button. He emphasises the avoidance of unnecessary manipulation of the stomach during operation, and points out the dangers that may occur from a too vigorous use of the clamps. He quotes three cases where acute gastric dilatation occurred after an anastomosis was performed, and emphasises the possibility of the occurrence of this dangerous complication.

Clairmont writes a paper, based on 258 operations on the stomach, from Professor Eiselsberg's clinic (v. Langenbeck's *Archiv*, LXXVI., Hft. IV. 2). The total mortality was 23 per cent. In the treatment of gastric ulcer, particular stress is laid upon the site of the lesion. If this is at the pylorus, a gastro-enterostomy is indicated; if, however, the ulcer is on either the anterior or posterior wall of the stomach, gastro-enterostomy does not give so good a result as partial resection. In this series of gastro-enterostomy cases, peptic ulcers have not occurred as a late complication. Posterior retrocolic anastomosis is the rule, and a button is used. Out of a series of 77 cases of malignant ulceration of the stomach, excision of the growth was performed in 24. Only 3 deaths occurred—a truly remarkable result. The writer lays stress on the fact that the radical gives a better prognosis than the palliative operation.

The average duration of life after gastro-enterostomy was found to be 200 days as contrasted with 400 days after partial gastrectomy. He quotes six cases of vicious circle in this series of gastro-enterostomy cases. He thinks that the occurrence of this complication may be avoided by:—

(*a*) Shortness of the afferent limb of the jejunum.

(*b*) Making the incision in the stomach wall in an oblique direction.

(*c*) Making the new opening as close as possible to the great curvature.

(*d*) Inserting suspension sutures.

The operation of pyloro-plasty has few supporters at the present day. Rutherford Morison (*Lancet*, February 11, 1905) details records of 20 cases. Of these eight were cured, in three the symptoms recurred. Later, at the British Association Meeting, he strongly advocates this operation in preference to gastro-enterostomy. Records of 28 cases were given, symptoms recurred in four only. The patients had been kept under observation for several years. Mayo Robson, in 28 pyloro-plasties, found that subsequent operation was necessary in eight cases. Mansell-Moullin considers that the permanent results of this operation are not nearly so good as that of a well-planned gastro-enterostomy. In connection with this question, a paper by Cannon and Blake (*Annals of Surgery*, May, 1905) is of great interest.

These observers, as a result of experiments on cats, have come to the following conclusions :—

(A) That the stomach is in no sense a passive bag which can be put at rest by the formation of a gastro-enterostomy.

(B) That during digestion the pylorus is the point to which the gastric contents are propelled. That this part inevitably becomes the more dependent, and that the intra-gastric pressure becomes three or four times greater at that part than at the cardiac end.

(C) That, notwithstanding the formation of a new channel, the food tends to be propelled through the pylorus.

(D) That circulation of food through the pylorus and duodenum, and back to the stomach, frequently does occur without symptoms.

(E) That symptoms of vicious circle depend generally on kinks in the intestine.

(F) That, unless the pylorus remains patent, thus allowing the acid of the gastric chyme to be neutralised by admixture with the duodenal secretions, the formation of peptic ulcers is an ever present danger after gastro-enterostomy.

It would appear from the above conclusions, which are

based on experimental work, that gastro-enterostomy is not an ideal operation, and that pyloro-plasty, performed after either the Heinecke Mickulicz, or Finney method, has much in its favour.

Mansell-Moullin (*British Medical Journal*, 1905) records the after-history of his patients operated on for stomach affections. He publishes a series of 24 cases out of 29 operated on in 1903. Of these, 21 were gastro-enterostomy cases, whilst in three pyloro-plasty was performed. The author is dissatisfied with the results obtained in pyloro-plasty owing to the tendency of the new scar to re-contract. He quotes 12 cures in a series of 21 cases of gastro-enterostomy, and five in which distinct benefit resulted. He points out especially that a gastric mucous membrane, which has undergone extensive changes from a long standing catarrh, cannot be expected to be restored to a normal condition by any operative procedure. Moreover, the cause of the original ulceration is in no way removed by the formation of a new channel. It is, therefore, only reasonable to expect a return of the old symptoms, unless great care is taken with regard to mode of life and diet. In a later communication, read at the Medical Society of London, October 23, 1905, he details end results of 60 cases of gastric ulcer treated by gastro-enterostomy. Of these, a complete cure resulted in 42. In this list all cases of doubtful cure were rigidly excluded.

Mayo Robson (*Congress of Surgery*, Brussels, September, 1905) has performed, in private practice, 97 posterior gastro-enterostomies for ulcer and its complication. He has followed up the after-history of these patients, and finds that in no less than 89 a cure resulted. The immediate mortality was 1·1 per cent.

Atkins (*British Medical Journal*, September 30, 1905) gives the after-history of 20 cases of gastric ulcer treated by a combined gastro-jejunostomy and jejuno-jejunostomy; 93·4 per cent. of these patients were completely cured; 6·6 per cent. were greatly relieved, and all were able to return to their former occupations. The immediate mortality was nil.

"THE APPENDIX."

From the mass of recent literature on this well-worn subject, one or two papers should be especially noticed. First

and foremost is the address, delivered in February, 1905, before the Royal Medical and Chirurgical Society, by Sir Frederick Treves. The subject of the address, viz., "The Prospects and Vicissitudes of Appendicitis after Operation," was based, partly on the author's large personal experience, and partly on a mass of statistical matter drawn from the case-books of the London Hospital. The subject was discussed under two heads :—

(1) The degree of imperfect relief, or imperfect recovery, after operation.

(2) The complications which may attend operation.

The first division was discussed under two subdivisions :—

(*a*) Imperfect relief after the interval operation.

(*b*) Imperfect relief after the evacuation of a perityphlitic abscess.

Forty-five cases, in which imperfect relief was obtained after interval operation, were analysed, and the causes discussed. Imperfect results after evacuation of a perityphlitic abscess were found to be due to—

(1) Persistent sinuses.
(2) Recurring abscesses.
(3) Recurring attacks of appendicitis.
(4) Fæcal fistulæ.
(5) Inflammatory deposits in the iliac fossa.

The majority of these conditions were found to be directly due to the non-removal, or imperfect removal, of the appendix at the time of operation. The author, whilst recognising this fact, is still adverse to the routine removal of the appendix in abscess cases. The complications which may attend operation on appendicitis can all be accounted for by sepsis present at the time, or occurring as an immediate or remote result of that operation. The statistics compiled for that paper showed the following to be the more common complications :—

(A) Fæcal fistulæ.
(B) Thrombosis of the femoral vein.
(C) Intestinal obstruction.
(D) Lung and pleural affections.
(E) Residual and secondary abscesses.

The time at which an operation should be performed during an attack of appendicitis was not discussed ; but Sir Frederick Treves, whilst agreeing that every appendix that has caused

trouble should be removed, disapproves of the rule, that after an abscess has once formed, the appendix should at a convenient period be sought for and excised. His arguments were :—

(1) That only 17 per cent. of abscess cases are liable to fresh attacks.

(2) That the risk of the second attack is comparatively small.

(3) That the operation, after an abscess has formed and quiesced, is a distinctly dangerous one.

(4) That the discharge of pus per rectum is not always positive proof of the evacuation of a perityphlitic abscess.

Ballance, in an address delivered at Eastbourne (*B.M.J.*, July 15, 1905), considers the question of the indications for operation. He then discusses the vicissitudes during convalescence, and subsequent complications. He gives a most interesting table of results of cases drawn from various clinics of well-known Continental surgeons, viz., Neuhaus, Talagnier, Kirmisson, Schwartz, Poirier, Lequeu, and Dieulafoy. Of these, the most striking table of results occurs in Poirier's clinic. This surgeon operates always at the earliest opportunity, in fact, as soon as ever the diagnosis is established. His results compare most favourably with those of the so-called "opportunists." Mr. Ballance sums up his conclusions as follows :—

(1) Every diagnosable inflamed appendix, with signs of increasing local or general peritonitis, should be removed.

(2) Every appendix, which has given rise to inflammation or abscess, should be removed.

(3) In serious acute cases, it is unwise to leave the appendix. The primary site of infection is more likely to cause the continuance of constitutional symptoms than the spreading of the adjacent peritonitis.

The question, when to operate in appendicitis, has been the subject of recent papers by Bernays, Von Renvers, Schmitz, Brinkmann, &c.

Bernays (*Centralblatt für Chirurgie*, July 8th, 1905) considers that the ideal treatment is operation at the earliest possible stage of the disease. That, if seen later, expectant treatment gives better results than operation. He advocates

the administration of laxatives and brine enemata in opposition to the well-known Ochsner line of treatment.

Von Renvers (*Medizinische Klinik*, 1905, Nr. 20), in considering the favourable time for operation, draws distinction between—

(1) Simple appendicitis cases.
(2) Purulent „ „
(3) Septic „ „

In the septic cases, one should always operate as early as possible. If the case is not seen until 48 hours have elapsed, expectant treatment is preferable to operation. In localised abscess, expectant treatment during the first five days is better than immediate operation. If the attack diminishes after five days, operation is better postponed. If the exudation is increasing, the abscess should be emptied with the removal of the appendix. He deprecates early operation in cases of simple appendicitis.

Schmitz (*Berliner Klinik*, 1905, Hft. 203) points out the frequent impossibility, in early acute cases of appendicitis, of distinguishing by physical examination the pathological condition of the appendix. Immediate operation is imperative in all but the quite mild acute cases. Even after 48 hours, he prefers immediate action to waiting for an interval operation. He does not advise seeking for and removing the appendix in all cases of abscess formation. The usual indications for the interval operation are given in detail. In suppuration in Douglas's pouch, drainage is recommended either through the vagina or rectum, he does not believe in washing out the peritoneum in cases of profuse peritonitis.

Brinkmann (*New York and Philadelphia Medical Journal*, May 27, 1905) is a strong advocate for early operations in the majority of cases. He believes that early diagnosis is generally a simple matter, and that difficulty of diagnosis should never be given as an excuse for postponing the operation. He is a strong opponent to the Ochsner treatment of appendicitis, and considers it is based on a wrong principle. He points out that spread of infection depends little on actual intestinal peristalsis, but more particularly on respiratory movements and contiguity of tissue.

ON THE USE AND MISUSE OF TUBERCULIN.

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One cannot do better than refer the reader to Bulloch's able paper in the November number of The Practitioner. It is, therefore, unnecessary to recapitulate the means whereby Wright has enabled us to estimate the resisting power of the individual to a specific organism; or to quote tables of statistics in proof of the fundamental laws which he has formulated. We may take these as a simple exposition of the principles that constitute the group of phenomena, hitherto vaguely called Immunity. Whether such Immunity is produced by Nature in her effort to combat bacterial invasion, or whether by the hand of man, the chemical processes involved are identical. In Nature, the organisms are destroyed by the host; some of them, or their toxins, find their way into the blood or lymph stream, and by their presence increase the power of the invaded one to destroy further hordes: with this exception, that an overdose of the toxin will produce exactly the opposite result, and lessen the amount of protective material in the blood.

Consider a severe case of phthisis. Clinically we find high and low temperature, sweating, wasting, and the evidences of the presence of the tubercle bacillus in one or more organs and in the blood. The greater chance the bacilli have to get into the blood or lymph stream, the more rapid is the progress of the disease. In other words, the sufferer is the victim of tubercular septicæmia. Often much may be done to mitigate this by rest, and suitable environment, so that the continual liberation of bacilli into the circulation is minimised. The other extreme is one in which the focus of disease is cut off from the blood-stream, few toxins get in, and the result is either slow progress, or deterioration, according to the inherent resistance of the individual. It seems waste of words to repeat these everyday facts, yet what do we find done frequently to help—generally the multiplication of the bacteria, wher tuberculin is "tried." Such an amount of the dead organisms

with their toxins is introduced in the body as to cause a further rise of temperature, and an increased diminution in the power of protection. Dose upon dose is repeated: instructions even are issued in print to build up the dose (as if the host were a healthy animal) at frequent intervals, until the end is acute general tuberculosis, and the inoculating material is discredited. It is a queer irony that has left it to another, of another race, to point out the proper use of this perfect remedy.

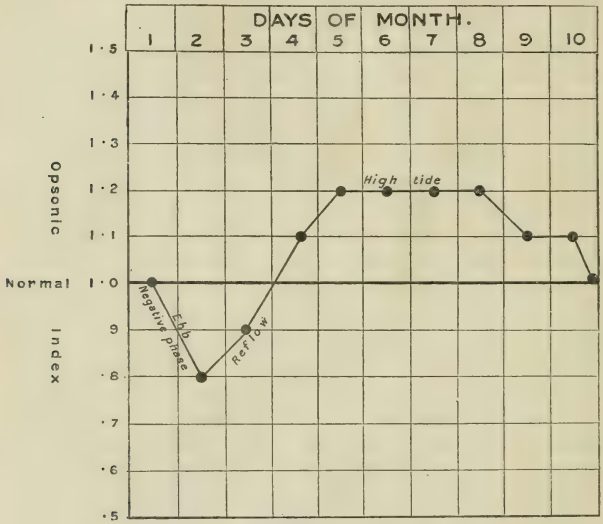

Fig. 1. *Diagram of opsonic curve.*

By his discovery of the opsonic index, Wright has given to the world a means of accurately determining the resistance of any individual, at any particular moment, to the invasion of various known pathogenic organisms. He has shown how this resistance is first lowered on the introduction of a "vaccine," composed of the dead bodies of the organism in question: how a reaction subsequently sets in, resulting, if no fresh toxic material is introduced, in a rise in the resisting power as measured by the opsonic index: how after a while this high tide of immunity is succeeded by an ebb. Such an ebb may be

accentuated by an overdose of bacterial vaccine, or, if the dose is properly proportioned, the fall of resistance may be very small and transient, and the net gain in the reflow so great, that substantial advantage for the individual is derived from the inoculation.

Having grasped these premises, we are confronted clinically, in tuberculosis, with a series of problems as regards the opsonic index, yet each bearing in reality the same solution; and a study of these at once shows the futility of using tuberculin in a mechanical, unreasoning, unintelligent fashion.

Sufficient work has been done by Wright, Douglas and their immediate pupils; by Bulloch and the workers in his laboratory, to place the facts of "opsonism" on an indisputable basis. It is significant to note that no worker has obtained results other than in complete harmony with the original investigators.

For the convenience of understanding, we may classify tubercular cases under the following heads, according to their opsonic curves.

(*a*) *Those of a low opsonic index, which does not vary from day to day appreciably, e.g.*, cases in which the tubercular lesion is shut off almost entirely from the blood stream, and little or no bacteria get into the circulation. The disease makes slow progress, and there is little or no rise of temperature. Such cases are lupus, some forms of gland, joint, or organ infection, and *all early* cases of tubercular infection of the lung. Here there is little attempt at self-immunisation, because there is practically no auto-inoculation.

These are the simplest and easiest to treat; not, however, by frequent and regularly spaced injections, but by a proper observance of the alteration of resistance produced by the introduction of the vaccine.

For the first few hours after an accurately estimated dose, say, $\frac{1}{1000}$th milligram of Koch's T.R., a slight ebb, or negative phase (Wright), sets in, to be followed by a flow and high tide. As soon as this high-water mark of resistance shows signs of being left, another small dose is introduced, followed by its ebb and flow. The dose must be so apportioned, and the time so spaced, that gradually the spring-tide mark of immunity is reached, a point far above the normal line of resistance. It

is found that this can be maintained after a while with little difficulty, and with increasing time spaces for inoculation.

To illustrate:—On page 604 of THE PRACTITIONER (November, 1905) Bulloch alludes to the case of an eminent scientist, who contracted a localised tubercular pleurisy, and whose opsonic index was found to be only ·4 after rest and open air. The sequel to the story is instructive. It is now 14 months since he was first vaccinated: his index rapidly improved, and at the present time he is in full work, with his index standing at 1·2. The last inoculation was made some months ago. (To those who forget, the normal figure of merit is taken as 1·0.)

The following cases in this class are taken from my note-book:—

1. E. W., female, ætat. 54. Signs left apex. T.B. in sputum. No rise of temperature, but loss of flesh, appetite, and strength.

1904.

April 27. Opsonic index. ·42. Injected $\frac{1}{1000}$th Mg. T.R.
„ 29. „ „ ·8.
May 3. „ „ ·77.
„ 8. „ „ ·75. Injected $\frac{1}{800}$th Mg. T.R.
„ 17. „ „ ·9.
„ 29. „ „ 1·17. Gain of 5 lbs. since April 29.
June 2. Injected $\frac{1}{800}$th Mg. T.R.
„ 5. Index, 1·0.
„ 12. Injected $\frac{1}{800}$th. Mg. T.R. index, 1·9.

This patient I lost sight of for several months; she returned at the beginning of November with cough and loss of weight.

Nov. 1. Index, ·4.
„ 4. Injected, as temperature was nearly normal since 1st, $\frac{1}{800}$th
„ 6. Index, ·5, showing that negtive phase, if any, had been transient.
„ 12. Index, ·9. Cough less.

This case illustrates the general law of ebb and flow, and shows the importance of not abandoning the treatment, or the watchful index, even though it is high. She has been placed, unlike most lung cases, in this class, because of her persistent low index and small rise of temperature.

2. Female, ætat. 57. Lupus of face. Tubercular ulceration

of cornea, and infection of the ankle. The lupus is of 51 years' standing. Finsen light has failed. Opsonic index low, ·5.

Mar. 18. Injected $\frac{1}{800}$th Mg. T.R.

„ 19. Index, ·4. Appears to have felt slightly depressed.

„ 21. Index, ·9.

„ 23. „ 1·1.

"This patient appears to be particularly susceptible to tuberculin. The face is slightly paler, and the nodules slightly shrunken."

Mar. 28. Index, ·9. Injected $\frac{1}{1000}$th Mg. T.R.

„ 30. „ 1·1.

April 10. „ 1·0. Injected $\frac{1}{1000}$th. Mg. T.R.

„ 24. „ 1·02. The raised tubercles of skin are practically gone; no raised patches; face much paler; ulcer on cornea disappeared.

The patient decided to discontinue the treatment, and moved for the summer to Southend. At my request, however, the blood was sent to me for examination at various intervals.

May 13. "Has had a bad cold" was the report. Face same, index ·8.

„ 24. Index 1·1. June 22, 1·0; July 7, 1·24. This continued until September 10, when a sample showed ·6.

Sept. 12. I went to Southend and found the face was slightly becoming nodular, a fresh corneal ulcer had started, and the ankle was slightly tender. Injected $\frac{1}{1000}$th Mg. T.R.

„ 17. Index ·9. General improvement.

„ 23. „ ·9. September 24, injected $\frac{1}{1000}$th. Mg. T.R.

„ 30. „ 1·0. Eye well. Skin shows no nodules, is paler, and slightly peeling. Ankle less tender.

Oct. 15. Index ·9. Condition improving. Injected $\frac{1}{1000}$th Mg. T.R.

Nov. 2. „ ·9. Still improving.

„ 4. Injected $\frac{1}{800}$th.

Nov. 9. Index ·9. Her condition now is better than it has been at all, and there seems no reason why she should not be cured.

„ 17. Index 1·9. The face has considerably improved since the 9th.

This case illustrates again the pity of a break in the continuity of treatment; but again affords proof of the almost mathematical precision of the opsonic method in this type.

3. W. L., a very early case of phthisis, infected from his wife; has had a slight cough for a month. T.B., a few, in sputum. Temperature, normal; no loss of weight. Feels depressed and weak, and unable to do manual labour without sweating profusely. No physical signs in lung except slight + V.R. right middle lobe.

Nov. 4. Index ·9.

„ 6. Injected $\frac{1}{800}$th Mg. T.R.

„ 8. Index ·78. Shows slight negative phase. No rise of temperature.

„ 11. Index 1·0. Cough disappeared; feels as if he had had a strong tonic, and is much stronger.

„ 15. Index ·48, but no rise of temperature. This drop is therefore probably not due to auto-inoculation. Injected only $\frac{1}{1000}$th Mg. T.R., as previous injection gave a negative phase even on second day.

„ 18. Index 1·2.

„ 27. „ 1·0.

„ 29. Injected $\frac{1}{800}$th Mg. T.R.

He will probably now go through the winter with less frequent inoculations according to his opsonic curve. He appears perfectly well, with no cough and no sputum.

Supposing this case had been treated by the prescribed method, $\frac{1}{500}$th Mg. T.R. would probably have been given. As there would have been little or no reaction, so far as the temperature could show, the vaccinator would boldly have injected a larger dose, perhaps even two days after the first inoculation (according to instructions). Sooner or later the temperature would have shot up, and revealed, only too late, a condition of tubercular septicæmia.

This is no mere surmise, but a picture of what is frequently happening. Only a few weeks ago, a medical man told me he did not believe in tuberculin; he had tried it on a case of tubercular disease of the bladder by the easy method of frequent and increasing doses, and the man had quickly gone to the wall with general tuberculosis—a striking example of how to convert a local condition into one of general septicæmia by blindly lowering the protecting power step by step.

Perhaps the easiest cases in this class are lupus and glandular infections in children, but space will not permit of illustrations of the latter; these have already been fully dealt with by Wright.

(*b*) *Early Cases showing a high Opsonic Index.*—These are generally slight cases of glandular infection in children, and with careful feeding, local application of heat by sandbags, and seaside air immunise themselves. There is no need to inject unless the index falls before the lesion disappears.

Bulloch has published a series of lupus cases of high index, *i.e.*, those and those alone which are benefited by Finsen ray, or equally well by the less expensive method of hot fomentations, or hot sandbags, applied locally to the infected skin. The result is a determination of blood rich in opsonins to the lesions, and the rapid destruction of the bacteria.

A valuable feature of the opsonic method lies in the fact that a new weapon is provided for accurate diagnosis. Wright, Bulloch, Lawson, Urwick, and others have conclusively shown that no normal person ever gives a high index.

(*c*) *Cases of Tubercular Infection which show from Day to Day, or at varying Intervals, great Variations in the Opsonic Index.*—Bulloch (THE PRACTITIONER, p. 603, Nov., 1905) quotes Urwick's observations (*B.M.J.*, July 22, 1905) of cases of pulmonary tuberculosis which show this variation. I have also observed the same variation in one case of glandular infection, and in a case of bladder and kidney infection. Bulloch says that these cases afford room for speculation. If, however, we refer again to Wright's "law of the ebb, flow, and reflow," and couple with it the phenomena of *over* auto-inoculation, the explanation is by no means complicated. We may assume that all these cases have initially a low resistance, else they would not have been infected.

Auto-inoculation produces, after a negative phase (ebb), a flow, and a high tide (high index), only to be rapidly run out by a big overdose or doses of the toxin. The factor is, as he says, due to the anatomical position of the lesion, whereby toxins may be readily and rapidly poured into the blood or lymph stream. Indeed, it is usually possible to obtain cultures of tubercle bacilli from the blood, proving the condition to be one of tubercular septicæmia.

Similarly, as Wright has pointed out, such conditions may arise in tubercular disease of the hip joint, where the movements of the joint cause toxins to be rapidly taken up into the blood stream, resulting in a rise of temperature, and general disturbance.

Rest in bed in hip disease, with extension, *i.e.*, absolute rest of the joint produces an amelioration of the symptoms and sometimes a cure. That is to say, the conditions are so arranged that the focus is shut off as far as possible from the rest of the body. Here then is the keynote to the preliminary treatment of lung cases. Indeed, it is a matter of old experience that high temperature indicates rest in bed: that incessant cough, and consequent disturbance of the lung circulation, spells high temperature, and a rapid progress of the disease; and that the giving of opiates, which mitigate the cough, also produces a lowering of the temperature. A sudden rise of temperature is always coincident with, or very shortly subsequent to, a *sudden* drop in the opsonic index.

With a variable index, therefore, the question of inoculation becomes an exceedingly nice problem. It is impossible to say how long the high tide will be maintained; and it is quite conceivable that auto-inoculation may take place at the same time as the tuberculin is introduced, thus making confusion worse confounded. Again, an exceedingly low index may be but the prelude to a flow, when the body has all the toxin it can do with, so that an inoculation will not only retard the rise, but produce a still further diminution in the resistance. It must be further realised that the "ebb" is no passive period, but one of exceeding activity so far as the colonisation of the bacteria are concerned.

Practically, then, we are unwillingly compelled to resort to that haven of the inept, expectant treatment, excepting that

we may do much to mitigate the conditions by absolute rest, opiates, fresh air, and good food. Here the sanatorium[1] is all helpful; but the moment we have ascertained that the patient's index has reached its usual low point or thereabouts, we may inoculate without fear of harm with a minimal dose of, say, $\frac{1}{2000}$th Mg., and proceed with the opsonic curve for our guide. That this is no fairy tale, no illusion of the laboratory, is proved by actual results of those who have had any experience of the opsonism of this type.

The following case of phthisis in which the preliminary observations were made by Wright, and afterwards carried on by myself, is a good illustration of this type.

A stockbroker, ætat. 37. Phthisis—recrudescence after two years. Abundant bacilli in sputum, numerous colonies; temperature ranging from 101, 102 to 99; hacking cough; moist râles all over right lung. Some consolidation middle portion; left apex fine râles with + V.R. and F. Weight, 11 st. 6 lbs.

He was put to rest in pure air, all through January, 1905. His index varied 1·8 to ·4 until it gradually levelled itself, 1·5 (Wright). $\frac{1}{800}$th Mg. T.R. was injected on Feb. 2.

Feb. 10. Improvement in physical signs, left apex cleared, lowering of temperature.

„ 13. Injected $\frac{1}{800}$th Mg. T.R.

„ 15. Index (Wright) 1·6; steady improvement. Temperature less.

„ 20. $\frac{1}{400}$th T.R. rise of temperature for two days. } Marked negative phases. Here too big a dose was employed, and too soon after that of the 13th.

„ 21. Index ·4.

March 2. „ 1·2. $\frac{1}{400}$th Mg. T.R. injected.

„ 13. $\frac{1}{400}$th Mg. T.R. } Marked negative phase. Temperature rising two days.

„ 14. Index ·6

„ 27. „ 1·4.

„ 28. $\frac{1}{400}$th injected.

„ 30. Index 1·8 } No negative phase.

At the beginning of April this patient had so far gained in weight and strength, with little or no cough, and few bacilli in

[1] "Cured" sanatorium patients (not injected) nearly always give a low index —their normal—and hence usually return with a recrudescence, or reinfection.

sputum, and a normal temperature. He was allowed to return, tentatively, to work in the city.

April 11. Index 1·6.
„ 12. Injected $\frac{1}{333}$th Mg. T.R.
„ 14. Index 2·4.
„ 15. „ 1·14.
„ 17. „ ·9.
„ 19. „ ·85.
} It will be noted that he gradually dropped, probably as a result of a somewhat close time in town.
„ 20. Holiday to Bognor.
„ 26. Returned; has caught cold; slight rise of temperature. Index, 1·0. Weight, 11 st. $13\frac{3}{4}$ lbs. Note that the rest and holiday have helped him to partially re-establish his protective power.
„ 27. Injected $\frac{1}{333}$th Mg. T.R. Returned to work.
„ 29. Index ·9. Slight negative phase.
May 3. „ ·9.
„ 11. „ 1·3; looks well. Weight, 12 st. $1\frac{3}{4}$ lbs. Working hard last 14 days, and walked 10 miles yesterday.
„ 19. „ ·9; Weight 11 st. 13 lbs. Note drop of index and loss of weight, has had a week's hard work. Injected $\frac{1}{400}$ Mg. T.R.
„ 23. „ 1·06.
„ 29. „ 1·2.
June 3. Injected $\frac{1}{333}$th Mg. T.R.
„ 6. Index 1·75.
„ 14. „ 1·45.
„ 19. „ 1·1. Weight 12 st. 2 lbs. Injected $\frac{1}{200}$th Mg. T.R. of June 3rd. Note gradual fall as the effect of the injection wore off.
„ 20. Index not taken. Slight rise of temperature.
„ 23. „ 1·7.
July 7. „ 1·24. Weight unaltered.
„ 11. „ 1·4.
„ 24. „ 1·1. $\frac{1}{200}$th Mg. T.R. injected.
Aug. 4. „ 1·3. $\frac{1}{400}$th Mg. T.R. injected.

From this time he has remained perfectly well, coughing one pellet up in the morning, having no rise of temperature, and working in the city every day. *On October 27th* I took his index and found it to be ·7. Sputum, in spite of his

condition and weight, 13 stone, contained many colonies of T. B., but few pus cells, or staphylococci.

Oct. 30. Index ·8. Feeling slightly depressed.

Nov. 6. „ ·8. Injected $\frac{1}{800}$th Mg. T.R.

„ 8. „ 1·12.

„ 12. Weight 12 st. 12 lbs. Temperature remaining normal.

It cannot be denied that this case, which is one of many, is remarkable, in that a man with such marked physical signs in January was able to resume close work on April 1st, and continue during the hot summer going to town, and yet improve and put on weight. The lapse of injections again in this case is coincident with a drop in his resistance, and an increase in the bacilli in his sputum. Yet I think it is evident that these are for the moment merely saprophytic, and a further continuation of the inoculations has already begun to pull him up again. It appears, too, that nothing is to be gained by increasing the strength of the dose, as was done during the summer, but rather he might have benefited more rapidly had a smaller dose been adhered to. As it was, being a big, heavy man, it is possible that the increase of dose was not so detrimental to him as it would have been to a lightly-built individual.

I am indebted to Dr. Du Buisson, of Hereford, for sending me blood samples of a bad case of phthisis in a girl of 20. She again has reacted well to the inoculations, though it was apparent at first that her doses were too large. Her gain in weight, strength, and general condition has been very marked.

A case of tubercular disease of the bladder, vesiculæ seminalis and testes, sent also by him, showed an index of ·3. This case was exceedingly difficult to build up. The index seldom rising above 1·0. The improvement in weight, temperature, and urinary conditions was very marked, however, after 10 weeks' treatment. I regret that the man left the Hereford Hospital, and has been lost sight of.

It is not my purpose to multiply the record of cases treated by inoculation, but to use a few as illustrations of the principles involved in the practice of bacterial inoculation for tuberculosis, as guided by the opsonic curve. My object is rather to attempt to dissuade others from blindly inoculating without such data, and to endeavour to give an additional stimulus to

the study of this most fascinating subject. There are many things to write of in connection with this matter, such as the value of the opsonic method for diagnostic purposes in early phthisis; the extraordinary help it is in unravelling mixed infections in the lung, of tubercle, staphylococci, and even pneumococci; and how each may be dealt with in turn. Although, perhaps not absolutely included in the title of this paper, it would seem to be in order to consider briefly :—

The Opsonic Index as a Guide to Diagnosis.—It not infrequently happens that we are confronted with a case exhibiting troublesome cough, no physical signs, no bacilli in the sputum, no loss of weight, and no rise of temperature. We suspect tuberculosis, but are not sure; we may even follow the practice of giving a moderately large injection of tuberculin, with a view of getting a temperature reaction, as in veterinary medicine. It will be seen at once if we do this that we are giving the organism, if it is present, a grand opportunity of flaring up, by artificially producing a marked, and somewhat lasting, negative phase. It need hardly be said that this method of diagnosis is unwarranted even in dealing with the lower animals. We may again wait, losing much precious time, to see if anything further happens. We can, however, do much better by taking frequent readings of the opsonic index for a few days. In such a case, the index will be found to be seldom constant. It will always be a little above, or a little below, the normal. Bulloch has shown that the variations of the normal index are very slight; and Wright has recently found that the serum of an infected person, which is found on a certain day to be somewhere near the normal, if heated to 60° C. for a few minutes, retains a small amount of opsonising material, and will give a reading of ·1, or even ·2; but that of a normal person so treated, will give only an index of ·02, or thereabouts, as compared with a normal unheated serum, whose value is taken as 1·0.

Such a case has recently come under my observation. S. W., absence of all symptoms, except cough and weariness.

Nov. 9. Index ·84. No T.B. in sputum.

„ 11. Index ·8. No T.B. in sputum. Same serum heated to 60° gave ·15.

Nov. 15. Index ·84. No T.B. in sputum.
„ 18. „ 1·3. Says he feels better; cough less. Note this is coincident with rise of protective power.
„ 26. Index ·64.
„ 28. Inoculated $\frac{1}{1000}$th Mg. T.R.
„ 30. Index ·8.
Dec. 6. Index 1·2. No cough, feels stronger, and does not sweat on exertion.

This patient is probably suffering from early infection of T.B.

On the other hand, a constant normal level of the index will negative the presence of tubercular infection. A relative was sent to me for diagnosis. She was suffering from a pulpy knee-joint, the result of several injuries. Five successive indices showed ·97, 1·0, 1·0, 1·0. 1·0. Surgical interference, however much it was desired, was at once negatived. The knee is now recovered under rest.

Another instructive and interesting case is now under observation. P., a lad of 21, had his leg removed in a home for tubercular disease of the knee-joint. I am told T.B. were found once in his sputum. He was discharged, and sent into the country with a hacking cough, purulent nummulated expectoration, and a hectic temperature. Sweating profusely, wasting obviously, and, with clubbed fingers, he looked a typical clinical picture of acute pulmonary tuberculosis.

The absence of such physical signs that usually obtain in this condition aroused suspicion. Frequent examinations of sputum revealed no T.B. Half a dozen indices against T.B. came out as normal.

The sputum, however, showed an abundance of polynuclear corpuscles, which are infrequent in tubercular sputum; many colonies of staphylococci, and a good sprinkling of diplococci.

The index for staphylcocci was low, ·4. Inoculation with 2,500 million of dead staphylococci cleared these organisms out of the sputum to the patient's obvious advantage and gain in flesh. Evidently, however, as the cough and temperature still persist, there is another agency at work, probably the diplococcus. This organism is being investigated, and it seems not improbable, from what we know of the diplococcus pneumoniæ, that that may be the offender, and may have been

the cause of the necrosis in the leg, for I have recently ascertained that the medulla as well as the joint itself was infected. His opsonic index for this organism will be investigated.

This case again shows how infinitely better it is to use the opsonic test before embarking on curative measures with tuberculin.

It is clearly our duty to realise that, in this opsonic method of Wright, to whom be all the honour, and to whom I am ever grateful for his kindly help and encouragement, that we have now at our disposal an instrument of the most delicate accuracy. To him also is the credit of realising to the fullest extent, the simple method of immunising, Nature employs, by making use of the dead bodies of the infecting organisms. No chemical filtrates, extracts, residues, or precipitates involving unnecessary labour and error, but just the killed cultures, and in the proper proportion, are all that Nature requires. She will elaborate from this the proper protective substances.

New Tuberculin or T.R. of Koch.—Warning. This is sent out from Germany in small phials, and requires diluting 1,000 times. As it is the dried filtrate from cultures of tubercle bacillus, and has only been submitted to a lengthy process of fine grinding, it is conceivable that this mechanical process—with all due deference to Koch—has not destroyed the vitality of the organisms. It is absolutely necessary therefore to sterilise the dilutions in the ordinary way by heating to 60° C for 20 minutes.

For the literature of opsonins, I would refer the reader to the exhaustive list given by Bulloch at the end of his paper, in the November, 1905, number of THE PRACTITIONER, and which it is, therefore, unnecessary to recopy.

Since this article was written, the whole question of tuberculin inoculation has been discussed at the Medical and Chirurgical Society. Papers by Wright, Bulloch, Lawson, and Stewart were read confirming the principles of inoculation, and further evidence was furnished by Ross and Whitfield.

TROPICAL DISEASES.

A REVIEW OF RECENT WORK.

By R. TANNER HEWLETT, M.D., M.R.C.P., D.P.H.,

Professor of General Pathology and Bacteriology in King's College, London; Lecturer on Bacteriology, London School of Tropical Medicine; Physician to the "Dreadnought" Seamen's Hospital, Greenwich.

SINCE the appearance of the last review on the subject in THE PRACTITIONER for November, 1904, steady progress has been made in the further elucidation of the problems presented by many tropical diseases, although no startling discovery can be chronicled, the most notable "finds" perhaps being the discovery of a new *schistosomum* (*bilharzia*) by Catto, and of a spirillar form in "tick fever" by Todd and Dutton. In the last connection, we have to lament the death of that brilliant young investigator, Dutton, who was stricken down prematurely in the midst of his work.

KALA-AZAR AND DELHI SORE.

The work of Leishman, Donovan, and others on the parasite of kala-azar and tropical spleno-megaly has been confirmed and extended by many observers. The development of flagellated forms from these parasitic bodies in blood-cultures seems undoubted from the work of Rogers and Christophers. The flagellated forms appear, however, to differ somewhat from trypanosomata, and must probably be placed in a different group. Captain James, I.M.S., has published an important paper[1] on Oriental or Delhi sore. The following are his conclusions:—(1) The deposit of a tumour-like formation of granulation tissue is the essential condition in Delhi sore. The new tissue infiltrates, destroys, and replaces all the structures of the true skin, and, pressing upon the epidermis, causes it to atrophy and disappear, so that an ulcer results. Many of the cells composing the new tissue contain parasites, which, almost certainly, are the primary cause of the lesion. (2) The parasites cannot be distinguished by examination under the microscope from those obtained from the spleen and other organs in certain cases of spleno-

[1] *Sc. Mem. Government of India*, No. 13, 1905.

megaly and kala-azar. (3) On the other hand, the parasites met with in the Punjab are apparently capable of producing only the comparatively mild local disease known as Delhi sore, while those in Assam produce only the dangerous general disease, known as kala-azar. This raises many interesting questions, as, for example, whether the parasites of Delhi sore and of kala-azar, though obviously belonging to the same class, are different species. (4) A probable mode of infection in Delhi sore is by the accidental inoculation of material containing the parasites, and it is reasonable to suppose that such inoculation may be effected by a biting insect. (5) The evidence adduced points to the fact that even when numerous parasites are present in a Delhi sore on the skin for a long period, no general disease, such as kala-azar, results, and (assuming that the parasites of kala-azar and Delhi sore are identical) for this reason, as well as for the reason that no case of general infection with the parasite was found in the Punjab, where local skin infections with it are not uncommon, it is improbable that the path of infection in kala-azar is by way of the skin. And if any biting insect were proved to be the infecting agent of Delhi sore, it would not necessarily follow that this is the mode by which kala-azar is contracted. (6) The parasites were found in Oriental sores contrated in Delhi, Karnal, Shahabad, Lahore, Quetta, and Dera Ismail Khan, and for this reason it may be concluded that "Delhi sores," "Lahore sores," "Sind sores," "Frontier sores," &c., are one and the same disease caused by the same parasite. The ulcers known as "Naga sores" in Assam, however, are apparently of a different nature. (7) Attempts to communicate Delhi sore to two dogs failed. No experiment was made on human beings, but one of the sores of Case 10 was probably contracted by accidental inoculation from another. The generally accepted opinion that true Delhi sores occur on dogs and other domestic animals has yet to be confirmed. (8) There has been a tendency of late to regard all cases, usually diagnosed in India as "malarial cachexia with enlargement of the spleen," as being due to the parasite recently discovered in the spleen and other organs of some cases diagnosed under this designation in Madras and Calcutta. The evidence in this paper shows

that such an opinion is not justifiable in the light of the fact that, as regards most cases of great enlargement of the spleen occurring in the Punjab, a diagnosis of "malarial cachexia" would, in all probability in the present state of our knowledge, be correct.

In a later paper,[1] James further discusses the connection, if any, between malaria, kala-azar, and Oriental sore, and the occurrence of malarial cachexia in India. His principal conclusions are as follows :—

1. Kala-azar is a disease distinct from every other. Its symptomatology requires to be re-written.

2. It has no connection with malaria, and its presence and spread depend upon conditions different from those requisite for the presence and spread of that disease. It exists in some places where malaria is not present, and is absent from some places where malaria is intensely prevalent.

3. Its geographical distribution in India is more limited than that of malaria. Subject to correction, as a result of further study, I would say at present that it is confined to low-lying, more or less water-logged districts, where the rainfall is heavy. I was unable to find a case in the Punjab. As regards Assam, it appears to be most prevalent at present in the Sylhet district, but it is common in the Goalpara, Kamrup, Darrang, and Nowgong districts, and perhaps in some others that I did not visit. I believe that it does not occur in the Golaghal and some other districts.

4. In all probability the Leishman-Donovan parasite is present at some period in every case, and very probably is the cause of the disease, but the proof is by no means complete.

5. The geographical distribution of Oriental sore and of kala-azar and, therefore, of the parasites found in these two diseases, does not correspond, and it is probable that the parasites of these diseases, though indistinguishable in appearance, different species of a hitherto unknown group of organisms. Probably other species will be discovered in the near future. We may conjecture that they will be found in diseases other than Oriental sore and kala-azar.

[1] *Sc. Mem. Government of India*, No. 19, 1905.

6. True "malarial cachexia" must still be regarded as an important disease in India.

HÆMOGREGARINE OF A VERTEBRATE.

Hitherto, protozoa belonging to the gregarines have been met with only in invertebrates. Christophers,[1] however, describes a parasite which seems to belong to this class in an Indian field rat, *Gerbillus indicus*. In fresh preparations of the peripheral blood, the characteristic parasites are seen lying quite motionless in spaces in, what appear to be, enlarged pale red cells. The enlarged corpuscles are oval, corresponding to the shape of the parasite and the cavity which it occupies. The affected corpuscles average 10 μ in greatest length, and 7 μ in shortest diameter. Unaffected corpuscles in the same preparations vary from 5·5 μ to 6·5 μ. The substance of the corpuscles is of lighter colour than that of the normal red cell, and stains less deeply with eosin. In some cases the enclosed red cell is hardly distinguishable. The space occupied by the parasite is clearly outlined and oval in shape. The parasite appears as a vermicule, possessing a short "tail" sharply flexed upon the body. A refractile mass (nucleus) is seen lying close to the bent end of the parasite, and one or two refractile granules are usually visible in the "tail." No pigment grains are present. In addition to the motionless intracellular forms, especially in certain preparations, a number of free bodies, exhibiting active movements, are conspicuous. These resemble the encysted forms, with the exception that the "tail" is no longer curved inwards.

LEUCOCYTOZOON IN DOG'S BLOOD.

Another parasite of considerable interest is one occurring in the white corpuscles of the dog, discovered by Bentley in Assam, and further described by James.[2] The parasites inhabit the polymorphonuclear cells, and appear as definite oblong, almost quadrilateral, capsules or cytocysts which contain the oblong, somewhat bean-shaped, parasites composed of a homogeneous or slightly granular protoplasm with a large oval or rounded chromatin nucleus.

Attention has been directed to this and the foregoing

[1] *Sc. Mem. Government of India*, No. 18, 1905.
[2] *Ibid.*,, No. 14, 1905.

parasites in order that investigators may be on the look out for similar parasites in man.

PIROPLASMOSIS.

The subject of piroplasmosis has recently attracted a good deal of attention, and four important papers on canine and bovine piroplasmosis have been published by Nuttall, Graham-Smith, Wright, and Mettam.[1]

With regard to the "spotted fever of the Rocky Mountains," which was ascribed by Wilson and Chowning to infection with a piroplasma (*P. hominis* : *see* PRACTITIONER, December, 1902, p. 706), Stiles has re-investigated the subject, and has entirely failed to confirm the results of these investigators. Stiles[2] says :—

(*a*) "My efforts to find a *Piroplasma* in the fresh blood of 9 cases of the disease in man, and in the stained blood of these and several additional cases, have been negative, despite an actual microscopic study of more than 200 hours ; Ashburn has had similar negative results. Chowning was unable to demonstrate the parasite to us in the fresh and the stained blood of a typical case ; and several investigators who have since examined slides, both from Idaho and Montana cases, have not been able to find the *Piroplasma*. Accordingly, the work of 1904 has failed to confirm the conclusions of 1902 and 1903, and indications are not lacking that at least some of the stages of the supposed *Piroplasma hominis* consist in reality of vacuoles, blood platelets, blood dust, artifacts, and tertian malaria parasites. Wilson and Chowning reported that they were able to transmit the disease to rabbits, but I was unable to do this."

(*b*) "I have likewise been unable to confirm the hypothesis that this disease is transmitted by ticks, for while there is a certain amount of circumstantial evidence against this arachnid, one of the fundamental premises of the tick theory (namely, the piroplasmatic nature of the disease) is called into question ; and, further, cases are known in which a history of tick-bite has not been established."

(*c*) "I am unable to see any valid arguments in support of the view that the burrowing squirrel (*Citellus Columbranus*)

[1] *Journ. of Hygiene*, Vol. V., No. 2, 1905.

[2] *Bull. No.* 20, *Hygienic Laboratory*. (Washington, 1905.)

forms the original host for the disease, while I find several arguments against this hypothesis."

YELLOW FEVER.

New Orleans has recently suffered from a severe epidemic of yellow fever. Rosenau, Parker, Francis, and Beyer[1] have re-investigated the disease, and have come to the conclusion that the micro-parasite is still unknown, and that no abnormal elements can be discovered in the blood, that the infective principle may pass through the pores of a Pasteur-Chamberland B filter, and hat the incubation period after bites with infected *stegomyiæ* is usually three days, occasionally five days. For screening the sick wire-gauze of not less than 20 meshes to the inch should be employed; if the gauze is of wider mesh than this the *stegomyiæ* may pass through it.

Another example of the efficiency of screening the sick from mosquito bites, and of mosquito destruction for stamping out yellow fever, has recently been furnished in an epidemic at Panama. Here the first cases of the disease were concealed, and it was not until a serious epidemic was in progress that President Roosevelt, on his own initiative, Congress having refused to aid him, appointed Judge Magoon to Panama as Resident Governor of the Canal zone with autocratic power. The prevalence of fever was bad enough, but the demoralisation of public spirit in the American colony was worse. Governor Magoon found that, while some in utter panic were fleeing from the isthmus as a plague-spot, others had fallen into a state of cynical bravado. They professed contempt for the mosquito theory of disease dissemination, and refused to obey the preventive rules which had been formulated. They took a boastful delight in exposing themselves to mosquito bites, and tore holes in the netting which had been placed over the windows of the office buildings and hotels. The Governor soon changed all this, expressed his own fear of the disease, insisted that the evidence of the transference of the disease by mosquitoes was overwhelming, and arranged for the fumigation of every building in the city. Medical inspectors were also appointed, who daily examined every inhabitant. The effect of these measures is shown by the

[1] *Report of Working Party No. 2, Yellow Fever Institute* (Washington, 1905.)

figures of the incidence of the disease :—In May there were 38 cases; in June 62 cases; in July, after the institution of these measures, 42 cases; in August 27 cases; in September 6 cases; and since then not a single case.

DYSENTERY.

Researches by Schaudinn[1] have cleared up some doubtful points with regard to the *Amœba coli*, which, though now somewhat old, may be referred to, as they are of considerable importance. Schaudinn has been able to differentiate between this pathogenic amœba and certain other amœbæ which may be found in the intestine. He terms the pathogenic amœba of amœbic dysentery the *Entamœba histolytica*, and the other species, which may be met with in health (though is more abundant in intestinal catarrh), the *Entamœba coli*.

The main differences between these two forms of amœbæ, as described by Schaudinn, are as follows :—The *Entamœba coli* has a hyaline, feebly refractile protoplasm which forms well-defined pseudopodia. When at rest, there is no clear differentiation between ectoplasm and endoplasm, but when it moves, the part in front, which becomes a pseudopodium, is more hyaline. The nucleus is clearly defined, vesicular, and spherical in the resting parasite, which multiplies either by simple division or by schizony with the formation of eight-daughter cells. In the *Entamœba histolytica* there is a well defined ectoplasm and endoplasm, and the nucleus is often distinguished with difficulty. Reproduction takes place by division, or by budding. In division the daughter parasites are all about of equal size; in budding the daughter parasites are smaller than the remaining portion of the parent. Resistant forms are also produced, consisting of cysts enclosing light small bodies 3–7 μ in diameter. According to Schaudinn, the fully developed vegetative form, or amœba, is without action on cats, but if the fæces containing the amœbæ are kept until the spores form, and are then given to a cat, a typical dysentery ensues.

Musgrave and Clegg[2] have been able to cultivate the *Amœba coli* on a simple agar medium, provided bacteria are present in

[1] *Arbeit aus d. Kaiserl. Gesundheitsamte*, 1903.
[2] *Bureau of Gov. Laboratories, Manila, Bull. No.* 18, 1904.

addition. They have also shown that many apparently saprophytic amœbæ prove to be pathogenic on injection, and have found that a typical liver abscess is produced on injection of amœba cultures into the liver of animals.

Strong [1] has published an important clinical and pathological study on the *Balantidium coli*, a ciliated protozoon not unlike the ordinary *paramœcium*. He shows that infection with it is accompanied in 99 per cent. of the cases with diarrhœa, and that in two cases which occurred in Manila the organism invaded the walls and vessels of the intestine, producing a dysenteric condition.

MEDITERRANEAN FEVER.

A joint Commission of the Admiralty, the War Office, and the Civil Government of Malta was appointed early in 1904 to investigate this disease, and three important reports have been published.[2] It was found that the *Micrococcus melitensis* survived for 69 days in dry sterilised manured soil, for 80 days on dried fabrics, for 72 days in damp soil, for 37 days in sterilised tap-water, and for 25 days in sterilised sea-water, showing that it has a considerable capacity for a saprophytic existence. Monkeys were infected when kept in a dusty atmosphere containing the micrococcus. The organism was recovered from the urine in a large number of cases, but not from the sweat, skin, or fæces, though in guinea-pigs, experimentally infected, the micrococcus is passed in the fæces. The organism was found to be present in the blood, though in small amount—not more than one coccus in 4 cb. mm. of blood, from which it is concluded that it is extremely unlikely that the disease is conveyed by biting insects.

The most important observations, perhaps, are those of Dr. Zammit and Major Horrocks on the presence of the micrococcus in the milk of a considerable proportion of the goats of the Maltese islands.

Dr. Zammit first observed that the blood of goats fed with cultures of the *Micrococcus melitensis* soon gave an agglutination reaction with the organism. Dr. Zammit and Major Horrocks then examined the blood of six goats, which were brought to the lazaretto, and five out of the six were found

[1] *Bureau of Gov. Laboratories, Manila, Bull. No.* 26, 1904.

[2] Part I., Part. II., and Part III., *Royal Society*, 1904 and 1905.

to give the agglutination reaction. Major Horrocks next examined the milk of certain goats, the blood of which reacted, and was able to isolate the *M. melitensis* from it. Further investigations showed that, of 161 goats belonging to 8 different herds, 84, or 52·17 per cent., gave the agglutination reaction, and one or more goats in every herd examined were found to be excreting the micrococcus in their milk, in some cases in very large numbers. Since monkeys can be infected by feeding, and since goats' milk is largely used in Malta (also in Gibraltar, where the disease is prevalent), it seems probable that infected goats' milk may be the principal source of infection of man.

ANKYLOSTOMIASIS.

In the article in THE PRACTITIONER, November, 1904, p. 684, an account was given of the observations of Loos on skin infection in ankylostomiasis. Boycott now records a case of experimental skin infection.[1] Encapsuled larvæ, 13 days old, were applied to the skin of the forearm for two hours, and were then thoroughly washed away. After 27 days a definite eosinophilia was found in the blood of the subject, and after 50 days a few ova were detected in the fæces.

ANTI-VENOMOUS SERUM.

A series of researches, particularly by Capt. Lamb, I.M.S., has conclusively shown that anti-venomous serum is highly, if not absolutely, specific, a fact which must seriously limit the serum treatment of snake-bites.

In one memoir[2] Lamb shows, among other things, that the serum of a horse immunised with the pure venom of *Hoplocephalus Curtus* (Australian tiger snake) is strongly antitoxic for its corresponding poison (Tidswell); but it has no neutralising power for the poisons of any of the Indian colubrine snakes, against which it was tested, namely, *Naia tripudians*, *Naia bungarus*, *Bungarus cæruleus*, and *Bungarus fasciatus*; nor for the venom of a common sea-snake, *Enhydrina Valabradien.*

In another memoir[3] he comes to the following conclusions:—

[1] *Journ. of Hygiene*, V., No. 3, 1905, p. 280.
[2] *Sc. Mem. Government of India*, No. 10, 1904.
[3] *Ibid.*, No. 16, 1905.

1. By injecting a horse with pure unheated daboia venom, an anti-serum for this poison has been obtained. This serum is of considerable strength, and has a marked neutralising effect on all the actions of daboia venom both *in vivo* and *in vitro*. It should be of considerable therapeutic value in cases of bites from this snake.

2. The serum thus obtained is markedly, but not strictly, specific *in vivo*; it has no action on the poisons of five colubrine snakes, against which it was tested; it has a certain neutralising action on the venom of *Crotalus adamanteus*, but has no effect on the venoms of two other vipers, namely, *Echis carinata*, and *Trimeresurus gramineus*.

3. When tested *in vitro* against the hæmolytic actions of the various poisons, it is found that this serum has no neutralising effect on this action of any colubrine venom; that it neutralises the venom of *Echis carinata* as well as it does that of the poison with which it is prepared; that it has a marked, but not equally great, effect on the venom of *Crotalus adamanteus;* and that it has no neutralising action on the venom of another viper, namely, *Trimeresurus gramineus*. Further, when tested *in vitro* against the actions of various poisons, it is found that, while this serum neutralises well its homologous venom, it has no effect on the poisons of four other species—one colubrine and three viperine—namely:—(1) *Hoplocephalus curtus*, (2) *Echis carinata*, (3) *Trimeresurus gramineus*, and (4) *Crotalus adamanteus*.

4. These observations lead to the same conclusion, which was previously arrived at, and which receives the support of Noguchi's observations, namely, that an anti-venomous serum is markedly, but not strictly, specific, and that, in treating any case of snake-bite, the homologous serum must be used.

LEPROSY.

Some time ago, Rost announced that he had succeeded in cultivating the leprosy bacillus in a chlorine-free medium, and, with the cultures, had been able to prepare a curative fluid, which he termed leprolin. Experiments, conducted at the Kasauli Institute by Lieut.-Col. Semple, have, however, failed to prove the curative properties of leprolin.

ŒDEMA OF THE FACE.

By A. RENDLE SHORT, M.D., B.S., B.Sc. (Lond.).

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The causation of œdema of the face, due to other causes than Bright's disease, is, perhaps, scarcely so clearly set forth in the most popular text-books of medicine as the frequency of the condition might warrant. These notes were compiled principally in the hope of assisting hospital residents and others who see these cases fairly often.

The following are the causes of œdema of the face. Myxœdema, which does not pit on pressure, is not included:—

(*a*) *Acute or Chronic Bright's Disease.*—This is so well known as to call for no comment, except to say that the œdema may come on quite rapidly. The urine ought to be examined in every case of œdema of the face, but it is not common to find albumin unless the part of the face in which the swelling has commenced was about the eyelids and forehead.

One of my cases represents a type sufficiently interesting to be quoted.

A woman brought up her child, aged seven, complaining of swelling of the face, for which she was unable to account. She said the girl had been well, and had not eaten any indigestible food. The œdema was principally about the eyes. On examination, desquamation in fine ringed flakes was found on the chest and abdomen, and the urine was dark and solid with albumin. The tongue was still of the "mulberry" type. The mother now remembered that the child had had a sore throat a fortnight before. Œdema of the face is often the first symptom of nephritis following unrecognised scarlet fever.

(*b*) *Anæmia,* if very marked, may occasionally cause a little œdema about the eyes. The feet are also affected.

(*c*) *Food Poisoning.*—In my experience this is the commonest cause of œdema of the face, especially in children.

It is usually associated with an erythematous or urticarial rash on the chest and arms, and a slight rise of temperature.

Case 1.—A. E., woman, aged 26. Was seen on December 27, 1904, complaining of great swelling of the face, causing blindness. Patient had had no illness previously. On Saturday, December 24, she ate some fried fish, which she said was "quite all right." No one else partook of it, except that a child had "a mere taste." She had no pain or vomiting. Next day the skin itched, and later a rash came out on the chest. In the evening the face swelled. On the 26th the rash was marked, and the swelling of the face was worse. Condition on examination :—Very marked white puffy swelling of face ; the eyes completely closed up ; the forehead pitted deeply on pressure. On the chest was a marked urticarial rash, itching a good deal. On the arms were raised red patches about an inch square. The temperature was 99°, and the urine contained urates, but no albumin.

December 28.—The urticuria now gone ; the swelling of the face somewhat improved.

December 29.—Nearly well.

December 31.—Quite well.

Case 2.—J. J., boy, aged 10, seen on April 30, 1905, in the evening, complaining of swelling of the forehead. Was quite well till that morning, and had had no previous similar attacks. The night before he ate some fried plaice from a shop which the mother thought had a doubtful reputation, and she also thought the plaice was "queer." No pain or vomiting followed. That morning the boy's lower lip swelled a good deal ; this had subsided, but the forehead was now swollen. There were also all over the body white and red patches, somewhat mixed, with a flat surface and definite edge. The urine contained no albumin.

A blood count showed 6,600 leucocytes. A differential count gave the following result :—

Polymorphonuclears	72 per cent.
Large and small lymphocytes	36 „
Eosinophiles	0·6 „
Basophiles	0·6 „
Transitionals	0·6 „

Next day he was quite well.

Of the eight cases of this condition of which I have notes, two were due to pork, one was due to mackerel, and the rest to fried fish, mostly obtained ready fried at a shop. In one case there was nausea after eating the fish, in another the mother said it was "queer"; in one case pork obtained from a small retail shop on the Saturday, had been kept raw, and then cooked and eaten on the Thursday. This was in March. In seven cases, the swelling of the face was noticed within 24 hours, but did not always reach its maximum then. In every case, there was a rash consisting of flat topped raised red patches on the chest and arms, usually not itching. The temperature was always a little raised. All the cases got well within three days after the first visit. I put them on milk diet and gave a mixture containing Sulphate and Carbonate of Magnesia.

The diagnosis is made by a combination of œdema of the face, especially of the lips, with the rash, a raised temperature, absence of albumin in the urine, and a history of eating fish or pork.

The condition is, of course, a form of giant urticaria, though it may not itch.

(*d*) *Cold Draughts of Air.*—Œdema of the face due to this cause is usually unilateral. It is called by country people a "blast." I have seen several cases, of which the following is an example.

R. D., man aged 37, boiler maker, consulted me on April 22, 1905, for periodical swelling of the right side of the face, about the eye. No swelling was to be seen. He said it had no relation to fish or other food. He never got any swelling anywhere else. The urine contained no albumin. I saw him again on April 25, when there was a well-marked somewhat reddened patch of œdema over the right malar bone. On enquiry, I was told that he worked in a very hot room before furnaces, and that there was always a cold draught from the open door on the right side of his face. The œdema came on during or after work, and had appeared to-day, whilst he was in the furnace room. It soon passed away when he went home.

(*e*) *Angio-neurotic Œdema.*—This may, and frequently does, affect the face, but is usually unilateral in that case,

whereas all the above, except the last, are bilateral. There will probably be a history of previous attacks, and no cause will be found. There may be œdema elsewhere. I am inclined to think that some cases of œdema of the face, diagnosed as angio-neurotic œdema, may have been due to one or other of the foregoing causes.

(*f*) *Insect Stings.*—This may produce severe œdema of the face, usually localised to one side. I have seen one eye almost completely closed in consequence. The patient usually, not always, gives a history of being stung; the surface is often reddened, and a central puncture can usually be seen.

(*g*) *Sepsis.*—Œdema of the face may of course be due to inflammation about a wound, an alveolar abscess, orbital cellulitis, &c.

(*h*) *Anthrax.*—In addition to the type known as malignant pustule, there is a variety of cutaneous infection with anthrax, characterised by great œdema of the face, especially about the lips or one eye, going on to gangrene in many cases, and associated with severe constitutional symptoms.

(*j*) *Obstruction to Great Veins in the Thorax,* due more commonly to new growth than to aneurysm. I have seen one case, in which œdema of the face was very marked, due to an aneurysm communicating with the superior vena cava, presenting a continuous murmur with systolic intensification. The condition was verified by autopsy. In these cases, the œdema of the face is general, may affect the arms as well, and is associated with cyanosis and full veins.

(*k*) I have seen two cases of œdema of the forehead, which I could not place in any of the above classes. They rapidly improved.

Prize Essay.

THE TREATMENT OF LOCOMOTOR ATAXY.

By C. SHAW BOND, M.B. (Cantab.),
North Malvern.

GENERAL CONSIDERATIONS.

In locomotor ataxy, we have to do with a chronic disease the progress of which, though often marked by periods of spontaneous arrest, is generally slow and sure with an average duration of 8·3 years.[1] There are a few cases, however, which advance rapidly in spite of all treatment.

In such circumstances, to gain our patient's confidence, his willing co-operation in the treatment we may adopt, and his adherence to the rules of conduct we lay down for him is of immense value. We should give him to understand that much depends upon himself as to the progress of the disease, and, if we cannot encourage him to hope for a permanent cure, we can assure him that much can be done for the alleviation of his affliction. There is, as a rule, a considerable psychical element in the patient suffering from locomotor ataxy which must not be forgotten, and as hopeful a frame of mind as possible should be encouraged. In the last stages of the disease, it is useless to worry our patient with heroic forms of treatment, our object must be to endeavour to ease his suffering and to comfort him so far as we may be able.

The tabetic must be temperate in the widest sense of the word. Of alcohol he must partake very sparingly, if he can do without it so much the better for him; if not he may be allowed light wines with water or light beer. The less tobacco he uses the better. Sexual excess is particularly to be guarded against. In the later stages of the disease it is impossible, while in the earlier it is very injurious.

In some acute cases and those showing signs of spinal congestion, it may be necessary to keep the patient in bed, but as a rule exercise in the open air is beneficial, with the important proviso, however, that it must cease before

[1] Byrom Bramwell: 31 fatal cases, *Brain* Spring Number, 1902.

fatigue is caused. The patient should be cautioned that, however hard it may be for him, he must rest the moment he begins to feel tired. He must also be cautioned to be very careful to avoiding any injury to his joints. For fear of causing perforating ulcer he should not pare his corns with a knife. A moderate amount of brain work for the business or professional man, is beneficial; but all mental strain, worry, or excitement must be avoided.

The patient should be warmly clad, and should avoid exposure to cold, especially to damp cold.

A change to a warm climate in winter when it is practicable should be advised.

As to diet, as generous a one as the patient can conveniently digest should be prescribed, and the consumption of fats encouraged. A liberal use of water is useful for purposes of elimination.

DRUG TREATMENT.

When we consider the pathology of the disease, we cannot hope for a regeneration of those nervous tissues which have already degenerated, but only that we may be able to prevent further destruction. With this end in view many drugs have been suggested and used, the most important of which we will now consider.

Antisyphilitic.—All authorities agree that a large number of tabetics give a history of syphilis, or show signs of having previously suffered from it. Erb[1] found 90·35 per cent. such in 700 cases. But anti-syphilitic treatment in locomotor ataxy has not met with the success that we might expect from such figures, and much controversy has consequently arisen. Some believe that this form of treatment is useless; others have even asserted that it does positive harm. This, however. can only be so in advanced or unsuitable cases. Anti-syphilitic treatment is certainly *contraindicated* in very old or advanced cases, in very reduced, cachectic, and dyspeptic patients; in those who have already undergone repeated energetic courses without effect, and in those showing intolerance to mercury and potassium iodide.

It is to be *strongly recommended*, however, in all perfectly fresh cases, in which the primary syphilis did not occur too

[1] "Treatment of Tabes," *New Sydenham Society*, Vol. CLXX.

long ago; in all cases showing active symptoms of syphilis, and in those cases in which only an insufficient treatment of syphilis has been carried out.

The best method to adopt for a mercurial course is that of inunction. Half a drachm of mercurial ointment mixed with an equal part of lanoline should be rubbed in daily, into the inside of the thighs, axillæ, or over the abdomen, with all precautions. Erb[1] recommends 30 to 40, or more, inunctions, one after the other, combined with careful treatment of mouth, baths of 26°–27° R., very good nourishment, and plenty of fresh air. This treatment should be followed by a pause of some months, according to circumstances, during which tonics should be administered, *e.g.*, pills containing iron, nux vomica, and quinine. Where possible, the patient may be advised to get mountain air, or to take a spa cure. He warns against trying such an inunction course on patients going about their usual employments, and points out that the benefit derived is most noticeable during the interval of tonic treatment.

Where there are difficulties in carrying out this plan, the perchloride ($\frac{1}{48}$ – $\frac{1}{32}$ gr.), or the red iodide ($\frac{1}{12}$ – $\frac{1}{6}$ gr.) may be given in pill form.

Potassium iodide does not appear to have so powerful an effect as mercury, but it is certainly useful in some cases, and may be combined with the mercurial course or taken during the interval. It is especially indicated in cases with tertiary syphilis of skin, mucous membrane, or bones; in those with severe pains, rapidly progressing symptoms, or peripheral neuritis.

Weiss[2] reports a case in which most of the symptoms disappeared after taking *sodium iodide* in large doses, at first 75 grains daily, and increasing to 120 grains; 16 ounces were taken altogether.

Lately the "intensive" mercurial treatment has been tried. Dr. Leredde, of Paris, strongly advocates its early use; failures he considers to be due to commencing the treatment too late, or applying it incorrectly.

Professor Lemoine,[3] of Lille, speaks well of the hypodermic use of benzoate of mercury.

[1] *Loc. cit.* [2] *Brit. Med. Journ.*, February 24, 1894.
[3] *Revue Neurologique*, July 30, 1902.

In passing, we should remember, since prevention is better than cure, that there may be a possible prophylaxis for tabes, in the thorough and long continued treatment of syphilis in its first stages, and in warning all patients suffering from syphilis of the dangers arising from excesses, exposure, &c.

Arsenic has proved useful, though not so useful as in many other diseases. Still it may well be tried where the antisyphilitic treatment is contraindicated, or has failed. It is recommended by Gowers, Byrom Bramwell, and others.

The form in which it is administered matters little ; it may be advantageously combined with nux vomica and quinine.

Dr. James Taylor[1] has found arsenic with chloride of ammonium (a drug suggested by Gowers some years ago for diseases of the spinal cord), the most useful combination of drugs for tabes in his out-patient practice.

Silver Nitrate has been widely advocated, and has proved of undoubted use in many cases. It may be given in $\frac{1}{4}$ gr. doses t.d.s., in pill form with kaolin, and must be administered for months with considerable intervals. Osler says that silver nitrate allays the attacks of pains and lessens the liability to them. The drawbacks to its administration are, that it is liable to cause discoloration of the skin, and that it often produces dyspepsia. To avoid the latter, larger doses of the oxide of silver have been suggested, and are said to have as good results as the nitrate.

The orthophosphate of silver has also been given in increasing doses with good effect, and is said not to discolour the skin.

Chloride of Gold and Sodium has been used and praised by Bartholow, Whitla and others. The dose employed is $\frac{1}{30}$—$\frac{1}{12}$ gr. in pills t.d.s. It is accredited with causing absorption of morbid connective tissue formation, and Dr. Taylor[2] mentions a case which did well on this treatment, and relapsed without it.

Strychnine, largely used at one time, was prohibited and forgotten, but has again come into use ; it is well spoken of by Erb and Gowers. It may be usefully combined with a small dose ($\frac{1}{200}$ gr.) of nitro-glycerine, which causes the blood containing the tonic to flow more readily to the nerve centres.

[1] THE PRACTITIONER, Vol. II., p. 636, 1900. [2] *Loc. cit.*

Ergot has been much used and recommended, especially by Charcot, who administered it four days in the week; but much caution must be exercised in its administration.

Gowers says it is seldom distinctly effective, and is most likely to be useful if the symptoms suggest a secondary sub-inflammatory process.

Phosphorus, spoken well of by Dujardin-Beaumetz, *bromides*, not only as a calming agent, and *Calabar bean* have all been tried with success in some cases.

Organic extracts, such as "Brown-Séquesdine" and spermin, have been tried, but with no very definite results.

TREATMENT BY BATHS AND SPAS.

Little is definitely known as to the action of the various baths. Those of a high temperature are injurious, as are also those of low temperature. Those between 70° and 90° F. are the most serviceable in tabes. The thermal salt baths, containing CO_2, such as are to be found at Nauheim and Rheme, appear to be the most suitable. They are stimulating and refreshing, and, at the places mentioned, are to be found skilled physicians, under whose care the patient should place himself.

Iron baths rich in CO_2 act similarly, and may possibly be preferred when one wishes to combine the blood-forming and tonic action of iron with mountain air. Such may be obtained at Schwalbach, Franzensbad, St. Moritz, the Kniebis baths, &c.

Sulphur baths have been much recommended in combination with the mercurial treatment, and are largely used at Aix-la-Chapelle, Uriage, &c. This treatment can also be obtained at Bath. The mud baths, once largely advocated, are not much employed now.

Of baths in general, it may be said that all which cause sudden shock are to be avoided, as are also all hydrotherapeutics which act strongly; but much good may be effected by mild, careful, and long-continued methods, which may be carried out with plain as well as medicated waters. We may mention sitz baths of medium temperature, two to five minutes' duration, simple wet rubbing, local spinal and foot washings. The patient should be rubbed afterwards with warm towels. By these methods the circulation is improved, and the general condition benefited A period of six to eight

weeks, twice or thrice a year, may be wisely devoted to such treatment.

Electrotherapeutics.—Much difference of opinion exists as to the value of electricity in tabes. Osler, Dujardin-Beaumetz, and Gowers think it of little use, but Erb and Professor Rockwell[1] speak highly of it in some cases. The former advises the application of the galvanic current to the spine, one pole at the neck, the other in the lumbar region, the current passing up and down; both electrodes fixed, or the upper one moved slowly up and down.

No doubt much relief is obtained in many cases, but the treatment should be only carried out by skilled hands.

Suspension by means of a Sayres's or Sprimon's suspension apparatus has been tried in tabes, and many successes reported. But the treatment is not without much danger, and is falling into disuse.

Careful observations by Russell and Taylor[2] on a large number of cases at the Queen's Square Hospital seem to show conclusively that it has no real power in influencing the disease.

Gymnastics and Exercises have proved a very great help in the treatment of locomotor ataxy, especially in overcoming the ataxia. Frenkel[3] has devised many useful methods and suitable apparatus for this purpose, and Weis Mitchell[4] describes the more simple exercises which he has used with great success. With patients showing acute symptoms, much caution is necessary in beginning this treatment, but the more chronic cases rapidly improve. Our object should be to exercise and train the patient's powers of co-ordination rather than to strengthen his muscles. With this end in view we may begin by instructing him to perform accurately certain simple movements, such as abduction and adduction of various joints, touching definite points with his toes, or standing at "attention" not looking at his feet, according to his condition. We may then go on to more complicated exercises, which we may think out for him, and see that he accurately performs them. It is necessary that the pro-

[1] Hare's *System of Practical Therapeutics*, Vol. I., p. 191.

[2] *Brain* Summer Number, 1890.

[3] *The Treatment of Tabetic Ataxia by Means of Systematic Exercise*, Frenkel, translated by Freyberger.

[4] *Fat and Blood*, 8th edition.

ceedings should be carried out in the physician's presence, or under the supervision of some other intelligent person, who possesses a certain amount of authority over the patient.

THE TREATMENT OF SPECIAL SYMPTOMS.

Lightning Pains.—For these we may try in the first place simple external remedies, such as heat or cold, but with chloroform or ether upon the hyperæsthetic places, chloride of methyl and X-ray, sinapisms, opium or belladonna plasters, electricity, faradic brushing, &c.

Antipyrin is very useful, also phenacetin, antifebrin, exalgin ; strong doses often repeated are needed.

Salicylate of soda in 10–20 grain doses sometimes succeeds where the others fail.

Cannabis indica has also been found useful. The surest, however, is morphia, but it should be tried last, and with much care lest the morphia habit be induced. MM. Oberthur and Bousquet at the Congress of Neurologists at Pau, Anjou, recommended nitrite of sodium as being the only drug which gives relief, when the pains are continuous and resist all others ; it also acts favourably on the co-ordination.

Gastric and Intestinal Crises require similar treatment with rigid dieting and attention to the bowels and dyspeptic troubles ; mustard plasters to the epigastrium, and morphia hypodermically may be specially mentioned.

Laryngeal crises require inhalations of chloroform or ether, nitrate of amyl, the local application of cocaine. Galvanisation of the cervical region and vagi may also be tried.

Bladder Troubles.—Careful attention must be given to the bladder, and the complete evacuation of urine must be ensured. The catheter must be used if necessary with careful antiseptic precautions. The electric current, ergot and strychnine may be tried for paresis.

Charcot's Joint Disease.—For this little can be done beyond placing the joint at rest, and applying moderate pressure by bandages, or the application of iodine.

FAMOUS HOSPITALS AND MEDICAL SCHOOLS.

GUY'S HOSPITAL.

History and Buildings.[1]

[With Plates I. and II.]

Thomas Guy was born about 1645 in the North East corner house of Pritchard's Alley in Fair Street, Horselydown, less than a mile from the site on which he eventually built the hospital which bears his name. At 15 or 16 years of age, he was apprenticed for 8 years to John Clarke, bookseller and bookbinder in Mercers' Hall Porch, Cheapside, and, on the completion of his apprenticeship, was admitted a freeman of the Stationers' Company, and subsequently a freeman of the City of London. He at once established himself in business at a little corner house at the junction of Cornhill and Lombard Street, immediately opposite the Mansion House, and a little in front of the position of the present offices of the Liverpool, London and Globe Insurance Company, the actual site having been absorbed into the street early in the 19th century.

By the pursuit of the sale of Bibles, mostly printed abroad, and also Prayer Books and Psalms, Guy made a considerable business, though not without many struggles with the King's Printers, who looked upon this trade as a piracy and an infringement of their rights. About 1691, Guy and his partner Parker obtained the contract for all the Oxford University printing, and held it for years against the most strenuous opposition on the part of the Stationers' Company; he also went into business as a publisher on his own account in London. The bookselling and publishing business, however, lucrative as it was then compared with the present time, was not the chief cause of Guy's accession of wealth. "Some time after" (*i.e.*, after Guy had acquired money by printing Bibles

[1] The historical details are entirely derived from Wick's and Bettany's *Biographical History of Guy's Hospital*, a most complete and accurate work.

at Oxford), to quote Maitland,[1] "England being engaged in an expensive war against France, the poor seamen on board the Royal Navy for many years, instead of money, received tickets for their pay; which those necessitous but very useful men were obliged to dispose of at thirty, forty, or sometimes fifty in the hundred discount. Mr. Guy, discovering the sweets of this Traffic, became an early dealer therein, as well as in other Government securities, by which, and his Trade, he acquired a very great estate." . . . .

"In the year 1720, the South Sea Company proposed to the Government a Scheme for redeeming the publick debts by increasing their capital; which being approved of, it no sooner received the sanction of Parliament than the National Creditors from all parts came crowding to subscribe to the said Company the several sums due to them from the Government. By which great run, one hundred pounds of the Company's stock that before was sold for one hundred and twenty pounds (at which time Mr. Guy was possessed of forty-five thousand and five hundred pounds of the said stock), gradually arose to above one thousand and fifty pounds. Mr. Guy, wisely considering that the great rise of the stock was owing to the iniquitous management of a few, prudently began to sell out his stock at about three hundred, (for that which probably at first did not cost him above fifty or sixty pounds), and continued selling till it arose to about six hundred, when he disposed of the last of his property in the said company. Which has occasioned those the best acquainted with his affairs to aver that by the execution of the pernicious South Sea Scheme, Mr. Guy got more money within the space of three months than what the erecting, furnishing, and endowing his hospital amounted to."

Having, by the means briefly outlined above, amassed a large fortune, and having as a governor of St. Thomas's Hospital been struck by the urgent necessity for increased accommodation for the necessitous and suffering who were driven to seek relief at St. Thomas's, Guy spent the last years of his life in advancing his great project of building a hospital, to bear his name, which should be an asylum for those chronic or incurable cases which, owing to exigency of accommodation,

[1] *London*, 1739.

could not be retained for an adequate period in the wards of St. Thomas's.

Mr. Lane, an eminent architect, having supplied the plans and designs, the hospital was commenced in 1722, and completed with great rapidity, and opened by January 6, 1725. Thomas Guy had, however, died on December 27, less than a fortnight before the completion of his great scheme. He was accorded a public funeral, and his remains were deposited at the church of St. Thomas, Southwark, until the chapel of Guy's Hospital was completed, when they were transferred there, a monument by Bacon being erected over them in 1780.

In his will, after numerous bequests to various members of his family and to charitable objects, Guy left the residue of his estate on trust to certain fellow governors of St. Thomas's Hospital, to finish the two new squares of buildings for his hospital, and "to receive and entertain therein four hundred poor persons or upwards, labouring under any distempers, infirmities, or disorders, thought capable of relief by physic or surgery ; but who, by reason of the small hopes there may be of their cure, or the length of time which for that purpose may be required, or thought necessary, are, or may be adjudged, or called incurable, and as such not proper objects to be received into, or continued in, the present hospital of St. Thomas's or other hospitals, in and by which no provision has been made for distempers deemed or called incurable, of whom my mind is, that they receive and entertain lunatics, adjudged, or called as aforesaid, incurable, not exceeding twenty in number at one time."

"And my mind and will further is, that if my said executors and trustees shall not find cause, or, on any account whatsoever, not think fit to keep all or great part of the beds or wards in the said intended hospital filled and supplied with sick persons deemed or called incurable, as aforesaid ; it shall and may be lawful for them to cause any number of the said beds or wards to be filled and made use of, in like manner and with like patients, as the beds in the hospital of St. Thomas's are ordinarily used."

The original hospital when first opened consisted of the two quadrangles and the connecting colonnade, which form

PLATE I.

Fig. 1. *The Tomb of Thomas Guy in the Chapel at Guy's Hospital, after the engraving by Bartolozzi.*

Fig. 2. *Guy's Hospital in* 1725. *from an engraving by John Bowles.*

Fig. 3. *Guy's Hospital*, 1906. *The Front Quadrangle.*

the body of the present surgical block, known as Guy's House. This accommodation was soon found insufficient, and two wings, projecting from the front, and forming a square with the statue of Guy in the centre, were completed before 1739. All these buildings stand at the present day, the two squares accommodating the surgical wards, the east front wing containing the Governors' Court Room, the superintendent's house, and offices and the west wing, the Chapel and the matron's house. The governing body was formed very soon after the death of Guy, and the medical and surgical staff elected. In the old account book of the hospital is the following list of salaries, giving some idea of the staff of the hospital in its early years :—

Per Annum.	£	s.	d.
Treasurer		—	
Clerk	40	0	0
Steward	80	0	0
Chaplain	80	0	0
Two Physicians, £40 each	80	0	0
Two Surgeons, £40 each	80	0	0
Apothecary	80	0	0
Surgery Man	30	0	0
Apothecary's two Servants	78	0	0
Butler, with his Horse	67	2	8
Cook, and her Servant	32	0	0
Porter	35	0	0
Beadle	30	0	0
Matron	50	0	0
Eleven Sisters, £25 each	275	0	0
Eight Nurses, £16 each	128	0	0
Twelve Watchwomen, £10 8s. each	124	16	0
One Brother, belonging to the Lunatics	35	0	0
One Sister, belonging to the Lunatics	25	0	0

After the foundation of the Hospital, the Medical School was established very shortly by the familiar process of the Surgeons and Physicians taking pupils. From the very commencement, the pupils attended the Hospital practice of both St. Thomas's and Guy's, and the fees from the pupils were equally divided among the surgeons of the two institutions.

There is a very complete account of the medical and surgical

teaching at Guy's in the middle of the 18th century, in a correspondence between Mr. Joseph Warner, a surgeon to Guy's from 1745–1790, and a Mr. John Gunning, with reference to a dispute between John Hunter and his colleagues at St. George's. It gives such a vivid picture of the medical and surgical teaching at Guy's that it is well worth quoting in its entirety.

SURGEONS.

Mr. Guy's Hospital, being modelled from St. Thomas's, differs very little in discipline. Each surgeon sees the whole number of his patients once a week, when he presents out those who are cured, and gives directions for the rest. Particular bad cases are seen every day if necessary, because, by a rotation, one surgeon at least visits the hospital every day. On Saturday, the physicians and surgeons all meet and go in pairs to visit all their patients. The hours of business are from 11 to 1 o'clock. There is no house surgeon. One of the dressers is in waiting for a week by rotation to take the care of accidents, and the surgeon of the week is always in readiness to be called on if wanted for an operation. Friday is the general day for operations and for grand consultations. The physicians nor their pupils have any concern with the surgeons' theatre. Notice of operations is put up in each surgery, and sent to the surgeons only. The hours of attendance at both hospitals are the same.

SURGEON'S PUPILS.

Formerly they brought certificates of their apprenticeships, but now they only bring their money. There are customs understood, but no rules; in the case of misconduct, beyond the power of the surgeons, application would be made to the grand committee of governors, who have the power of expulsion. The fees of apprentices and of dressers belong to the surgeon under whom they enter. . . . . When a body is opened to inspect disease, anyone may be present. The time for opening a body is usually early in the morning, or after lecture at noon,. All the pupils within a reasonable distance from the hospitals are called to accidents. The pupils are considered as belonging to the hospitals, not to one particular surgeon. The surgeons and physicians are only officers of the hospitals, and receive a salary of £40 per annum. They are never present at courts of committee. The surgeons receive no other monies from the charity, and are amenable to the general court of the governors for their conduct. . . . . The pupils do not bring any certificate, but the gentleman's name with whom they served an apprenticeship, and the place of his abode, is entered in the steward's book at the time of his entry. . . . . They are obliged to submit to the rules that regulate the hospital and are subject to be expelled for any misbehaviour by the committee. . . . All the fees for the admission of the apprentices and dressers are the sole property of the gentlemen under whom they enter. . . . . All the profits arising from the admission of pupils are shared equally between the surgeons of St. Thomas's and Guy's Hospitals with the apothecary of each, so that there are eight claimants on each division, which takes

place on the first Monday in every alternate month. . . . . The dressers and pupils cannot be admitted for a less term than six months. . . . . On leaving the hospital there is a certificate signed by each surgeon of St. Thomas's and Guy's Hospital, specifying the time for which they entered. In that certificate, the word diligently is expressed, which, I think, should be omitted, and a blank left for the surgeon to fill up if it meets with his approbation. The hand-writing of the surgeon would carry more weight with it, and we should be less liable to advance what was not a fact. . . . . The dressers pay £50 per annum, or £31 10s. for six months; the pupils 24 guineas per annum, or 18 guineas for six months. The pupil's business is only to look on, and to make such an inquiry as he shall chuse of the surgeon who is then attending. . . . . There are not many bodies opened for examination; but where we can obtain leave for an inspection it is the business of the surgery man to acquaint the pupils with the intention, and all those that wish may attend. The time for doing it is not by any means fixed, but is generally done after the practice is over, and before the anatomical lecture for that day. . . . . It is the business of the surgery man to make them acquainted with every accident immediately on its entry, for which he receives 2s. 6d. per quarter. . . . . They may quit the hospital whenever they please, and return again when they chuse. . . . . When a pupil enters at either of the hospitals, he is considered as belonging to both, and has the same privilege at each. It is the business of the surgeon who attends to give them the best instruction he is able without considering to whom they entered. The apothecary enters the greatest number of them, not for himself, but for the surgeons. . . . . The surgeons do not receive any gratuity for operations. They find their own instruments, and keep them in good condition. . . . . They cannot become governors during their attendance as officers. There is not any contribution levied on them. . . . . There is not any difference in the manner of conducting the business at either hospital. . . . . At St. Thomas's Hospital the days of attendance are Tuesday, Thursday, and Saturday at 11 o'clock. At Guy's Hospital the days are Monday, Wednesday, and Friday, at the same hour. At Guy's we visit the whole house every Monday and Friday. At St. Thomas's, I believe, every Tuesday and Saturday. The Thursday morning is employed in the admission and discharge of patients with them, and the Wednesday with us. The time in visiting the whole house is nearly one hour and a half. . . . . There is not any house surgeon at either of the hospitals. . . . . We have not any fixed days for consultations and operations. If the former should be thought necessary it may be done with us either Monday or Friday, as the physicians should attend at the same time and on the same days. The operations are generally appointed at at twelve o'clock on one of those days that is usual to see the whole house. If there should be any case that requires an operation which would be more conveniently performed at any other time of day than the Monday or Friday, it is always done by giving a notice. . . . . When any operation is to be performed the day is fixed that is most agreeable to the surgeons, and notice is stuck up at the surgery of each hospital, mentioning the operation and by whom performed. There is not any notice given to the physicians, and it rarely happens that you see a physician in the theatre at the time.

When any accident is brought in, the surgeon whose week it is receives notice, and according to the nature of such accident, he either goes immediately over, or trusts the management of it to the dresser who is waiting there. . . . . The hours of attendance are the same, but, the days being different, it gives the pupils the opportunity of attending every surgeon at each hospital. There have been lectures read in anatomy in which observations in surgery has ever been introduced from the beginning, first by Mr. Girl, then Mr. Sharp, Mr. Warner, Mr. Else, and at present by Mr. Cline. The fee for these lectures and for the dissecting-room is twelve guineas. There are lectures read every morning at half-past seven on midwifery by Dr. Lowder, in the Borough; they continue until half-past eight. At ten o'clock in the morning Mr. Babington, the apothecary at Guy's, gives a lecture on chymistry, which continues until eleven, when the practice begins. Those mornings that pass without the lecture on chymistry, Dr. Saunders supplys with on the practice of physic. The chymical lectures continue until there has been two courses given, which employs them from the 1st of October until the month of May. The anatomical lectures are every day from one o'clock until three. These are read at St. Thomas's theatre by Mr. Cline, the former in chemistry, and the practice of physic at the theatre at Guy's. All the pupils that enter for the anatomical lectures pay seven guineas; if they chuse to dissect, and attend the dissecting-room, they pay five guineas extraordinary. The terms for the chymistry, materia medica, and practice of physic are ten guineas. I cannot take upon me to say when they were first instituted, but there were lectures read before the year 1750. There are not any chirurgical lectures given, but those that finish each anatomical course by Mr. Cline. They have amounted hitherto to twelve in number to each course. The lectures have always been delivered *viva voce*."

In 1760, a quarrel broke out between Guy's and St. Thomas's with reference to the privileges of students, and the partnership was dissolved, but in 1768 an agreement was again entered into, and, from that time, the Hospitals were, to all intents and purposes, two departments of a common teaching institution.

(*To be continued.*)

BY-PATHS OF MEDICINE.

SOME MEDICAL WORTHIES OF BATH.—II.

THOMAS GUIDOTT himself was a Hampshire man, and was born in 1638. His name is Anglicised Italian, for he was a descendant of Sir Anthony Guidotti. He was an Oxford man, and, on taking his M.B. degree in 1666, practised for some months at Oxford. In 1667 he settled in Bath, where Dr. John Maplet, "a noted physician of that place," helped him to acquire an extensive practice. In a few years, however, he made Bath too hot to hold him by his "impudence, lampooning, and libelling"; he therefore tried his fortune in London, visiting Bath in the summer. Wood describes him as a "person of good parts, well vers'd in Greek and Latin learning and intelligent in his profession, but so much overwhelmed with self-conceit and pride as to be in a manner somewhat crazed, especially when his blood was heated by too much bibbing." Hearne calls him "an ingenious but vain conceited whimsical physician." Guidott edited the third edition of Jorden's *Discourse*, to which he added a life of the author and an *Appendix concerning Bathe* by himself. He was a profuse scribbler on all sorts of subjects, including poetry, Biblical criticism and heraldry. Here we are concerned only with his writings on Bath.

His *Discourse of Bathe and the Hot Waters There* is a jumble of archæology, mediæval chemistry, and obsolete medicine. Its principal interest to the modern reader is psychological, for it is easy from the book to reconstruct the author. This is how he speaks of those who wrote of the Bath waters before him:—

"It hath been indeed the ill fortune of these Baths (which I may truly say are as good if not better than any Baths in the world) to lie a long time in obscurity, and not so much as to be mentioned among the Baths of *Europe* by any foreign Writer, till about the Year 1570; when that Excellent Person Sir *Edward Carne*, sent Ambassadour by Queen *Elizabeth* to Pope *Julius* the Third, and *Paul* the Fourth, made some Relation of them to that famous Writer

Andreas Baccius, then at *Rome*, and writing his elaborate Book *de Thermis*, into which he hath inserted them, upon his Relation, *Lib.* 4. *cap.* 13 (though somewhat improperly) among Sulphurous Baths.

"About the same time also one *John Jones*, an honest *Cambro-Briton*, frequenting the Baths for Practice, composed a little Treatise of them, which he calls *Baths Aid*, in which are some things not contemptible, though in a plain Countrey dress, and which might satisfie and gratifie the appetite of those times, which fed more heartily and healthily too, on good Beef and Bag-pudding, than we do now upon Kickshaws and Haut-gusts; yet nothing of the true Nature is there discovered, only as almost in all former Writers of Baths, chiefly Catholick, a strong Stench of Sulphur, and a great ado about a Subeterranean Fire, a fit resemblance of Hell, at least of Purgatory."

"Our Countrey-man Dr. *William Turner*, I confess, was more particularly concern'd to give a better account, than I find is done in his Discourse of English, German, and Italian Baths: And whether want of opportunity, or other impediment was in cause, I know not; but I find that at this stay they stood till the Famous Dr. *Jorden* took Pen in Hand, about the Year 1630. To whom I thought fit to make some Additions, at my first entrance on this Place some five Years since. And although that Learned and Candid Physician had *chiefly and more especially an intent to enlarge the knowledge of our Baths in* Somersetshire, (as he declares to my Lord *Cottington* in his Dedicatory Epistle) and hath performed more than any Man before him, yet what was first in Intention, was last in execution; and how small a part of that Treatise is spent upon this Subject, how short he is in some Material Points, and what Objections may be framed against his Opinion, I may sometime or other, with due Respect, more largely treat of; and for the present shall here, with good *Sem* and *Japhet*, cast a Garment over the Nakedness of this my Father."

"What hath been done since (except in some particular pieces of other Tracts, to the Authors of which the Baths are also indebted for their kindness and goodwill) is not worth mentioning. The old saying 's true, *Little Dogs must piss*, and what is writ upon an Ale-bench claims the greater affinity to

the Pipe and Candle ; especially if the best Wine at the Feast (which is usually kept till last) be but a silly Story of *Tom Coriat*, and an old *Taunton* Ballad new vampt, abusing the dead Ghosts of *Lud Hudibras* and *Bladud*, with a Nonsensico-Pragmatical, Anticmyado-Orientado-Rhodomontado-Untruth-Le Grand, which we Westerly Moderns call a GROTELYE, into the Bargain, a pretty Artifice in Rhetorick, to cry a thing up, and besmear, and *shed plentifully* on the Founder *Ordure, both Humane and Belliune*."

Bath reached the height of its fame in the eighteenth century, when nearly every one of consequence thought it due to himself to take the waters. Thus it became a centre of social, literary, and even political life. Our concern here, however, is not with the poets and statesmen who sought relief at Bath, but with the Physicians. We can only make hasty mention of a few of the most distinguished. Dr. William Oliver, who wrote a *Practical Dissertation on the Bath Waters*, which was published in 1707, began his professional career as a surgeon in Monmouth's Army in 1685. He was present at Sedgemoor, and, according to Munk, after the Bloody Assize, travelled in disguise to London in company with Judge Jeffreys's Clerk, to whom he had been recommended by a Tory gentleman who had sheltered him. He escaped to the Continent, returning to England as an officer in the Army of William of Orange in 1688. In 1692 he was admitted a Licentiate of the College of Physicians. In the following year he was appointed physician to the Fleet. In 1702 he settled at Bath, but some years later he was appointed physician to Greenwich Hospital. He died in 1716. We are unable to say whether it is the name of this adventurous doctor or that of some less distinguished namesake which has been attached by some enterprising baker to a well-known biscuit.

Perhaps the greatest medical celebrity of Bath in the 18th century was George Cheyne, an Aberdeenshire man, related to Bishop Burnet, who was born in 1761. He was himself educated for the ministry, and was tutor in a gentleman's family, but became a student under Archibald Pitcairn, then professor of medicine at Edinburgh, and the leading representative of the so-called iatro-mathematical school. Cheyne, who had a strong mathematical bent, naturally became an

adherent of Pitcairn's doctrines. He took a prominent part in the controversies excited by these doctrines. Migrating to London, he was elected a Fellow of the Royal Society, and began to practise his profession. He lived much, he says, with "the younger gentry and free livers," with whom his wit and learning made him popular. His manner of life aggravated a natural tendency to obesity, which he combated by strictness of diet. His health was finally re-established by a course of the Bath waters; and this led him to practise in the winter at Bath, and in summer in London. After some years he made Bath his permanent abode. He wrote a work entitled, *Observations on Gout and on the Bath Waters*, which passed through seven editions in six years. Having gradually relaxed the rigorous abstemiousness which had done him so much good, he again put on flesh to such an extent that he weighed 32 stone, and could scarcely stand. He once more cured himself by "a milk and vegetable diet," to which he confined himself for the rest of his life. Among his later writings may be mentioned an *Essay of Health and Long Life* (London, 1725); a treatise on *The English Malady* (London, 1733), which is a treatise on nervous diseases, spleen, vapours and lowness of spirits; and an *Essay on Regimen, together with five Discourses, Medical, Moral, and Philosophical* (London, 1740); and *The Natural Method of Cureing the Diseases of the Body and the Disorders of the Mind depending on the Body*, &c. (London, 1742). In his book on *The English Malady* he reports his own case. His youth was passed in close study, and he lived very temperately, though occasionally he indulged in good cheer; but even then his digestion was easily upset.

He was subject to tremor, and a "disposition to be easily ruffled on a surprise." On removing to London, at the age of 30, he changed his mode of life and associated with "bottle companions and free livers," for whose friendship it was only necessary to be able to "eat lustily and swallow down much liquor." He owns that he adopted this mode of life to help him in practice. He evidently became very popular and likewise very stout, but in a few years his health became affected and he grew "excessively fat, short breathed, lethargic and listless." Soon he was seized by a

fever, from which he rapidly recovered under the use of bark. After a year of only moderate health he was taken suddenly with a vertiginous paroxysm, "so extremely frightful and terrible as to approach near to a fit of apoplexy, and I was forced in it to lay hold on the posts of my bed for fear of tumbling out, as I apprehended." For this he was bled and given large doses of bark, without much help, for "it turned to a constant, violent headache, giddiness, lowness, anxiety and terror, so that I went about like a malefactor condemned, or one who expected every moment to be crushed by a ponderous instrument of death, hanging over his head." Soon all his "bouncing, protesting, undertaking companions" forsook him, and "retired to comfort themselves with a cheer-upping cup, leaving me to pass the moments with my own apprehension and misery." He says:—"I was forced to retire to the country quite alone, being reduced to the state of Cardinal Wolsey, when he said that if he had served his Maker as faithfully and warmly as he had his Prince, He would not have forsaken him in that extremity; and so will everyone find when union and friendship is not founded on solid virtue, and in conformity to the divine order, but in sensual pleasures and mere jollity. This silly circumstance I mention because I thought then it had some share in my succeeding melancholy."

He retired to the country, carried a seton for many months, and turned himself into an apothecary's shop. In spite of all his infirmities, his mind continued bright and active, while the time was favourable for much meditation, so that we find him turning to set his spiritual affairs in order, believing that he was soon to enter into an "*unknown state of things*." The following spring he was advised to try the Bath waters, which he did with some benefit, but soon relapsed. Then he went to Bristol to try the waters there. These, with strict diet and exercise, improved his state, but to no great degree. Here some friend told him of a wonderful cure wrought by Dr. Taylor, of Croydon, by a milk diet.

Returning to London, Cheyne arranged for a supply of milk, which, with seeds, bread, mealy roots and fruit, composed his dietary. After six months of this he was much reduced in flesh, and improved in health, but suffered from constant pain in the stomach. During all this time he kept at work, in the

summer in Bath, and in the winter in London, devoting himself more especially to chronic and nervous diseases, all of which, he says, who can afford it, arrive at some time in Bath.

After this he returned to ordinary diet, never taking above one quart or three pints of wine a day (this was temperance in those days!) and had good health for many years. But he could not walk up more than one pair of stairs without "extreme pain and blowing," and if he had any distance to walk, his servant had to follow him with a stool for him to rest on.

The following is a description given of him about this time:—

"On the other side was Dr. Cheyne, a Scotchman, with an immense broad back, taking snuff incessantly out of a ponderous gold box, and thus ever and anon displaying to view his fat knuckles; a perfect Falstaff, for he was not only a good portly man and a corpulent, but was almost as witty as the knight himself, and his humour being heightened by his northern tongue, he was exceedingly mirthful. Indeed, he was the most excellent wit of his time, a faculty he was often called upon to exercise, to repel the lampoons which were made by others upon his extraordinary personal appearance."

In his later years Cheyne suffered much from gout and melancholia. His remedies were amongst others emetics, tobacco, bark, Bath waters, fœtid gums, volatiles, and viper's powders. At last he took to opiates, "which I knew were a slow poison, but one will stop at nothing for even a moment's respite in such extremities." He went to his old regimen, to which he adhered for the rest of his life. Even an ounce or two of animal food was enough to cause suffering. In two years he was able to consider himself well.

He was a butt for the wits of his day. Young, in the "Epistles to Pope," says:—

"—— three ells round huge Cheyne rails at meat."

A Dr. Wynter launched the following epigram at him:—

"Tell me from whom, fat-headed Scot,
Thou didst thy system learn;
From Hippocrates thou hast it not
Nor Celsus nor Pitcairn.

Suppose we own that *milk* is good
And say the same of *grass;*
The one for babes is only good,
The other for an *ass.*

Doctor! one new prescription try,
(A friend's advice forgive)
Eat grass, reduce thyself and *die,*
Thy *patients* then may *live.*"

To which Dr. Cheyne replied as follows:—

"My 'system,' Doctor, is my own,
No tutor I pretend;
My blunders hurt myself alone,
But *yours* your dearest friend.

Were *you* to milk and straw confined,
Thrice happy might you be;
Perhaps you might regain your mind,
And from your wit get free.

I cannot your prescription try,
But heartily forgive;
'Tis natural you should bid *me* die
That you yourself may live."

All contemporary testimony says Dr. Payne gives a favourable idea of his personal character. His reputation with the public was immense, and he was intimate with the most eminent physicians and other persons of note in his time. He died at Bath on 13th April, 1743.

In 1752 Tobias Smollett tried to establish himself as a physician at Bath. But he was too quick-tempered, and, it must be added, too frank in dealing with his professional brethren as well as with patients, to gain even moderate success in medicine. An example of his impolitic frankness—unless it it is rather to be regarded as inspired by revenge for his failure to secure clients—was afforded by his "Essay on the External Use of Water," published in 1752. In this he set himself to prove that for hydrotherapeutic purposes the mineral waters of Bath had little advantage over any other water. It is not surprising that he left Bath soon afterwards.

Notes by the Way.

A New Year's Greeting.

In greeting our readers at the opening of a New Year, we wish to express our thanks to the medical profession for the large measure of support we continue to receive from them. This has placed THE PRACTITIONER in the front rank of British medical journals in point of bonâ fide circulation, and as the number of subscribers shows a steady increase, we feel justified in concluding that the journal satisfactorily meets the needs of the average practitioner. Another evidence of growth is the number of original contributions offered for publication, and these, while making the work of selection somewhat embarrassing, ensures the maintenance of a high standard of quality, scientific and literary. A feature in THE PRACTITIONER which seems to find particular favour with readers, and which has elicited many expressions of approval in several of our American contemporaries, is the allotment of whole numbers to the exposition and discussion from every point of view of important subjects of practical interest. In the coming year we propose to continue the publication of these special numbers, and we have the promise of original papers from men of the highest eminence.

In journalism not to advance is to retreat; no effort therefore will be wanting on our part to make THE PRACTITIONER, if possible, still more useful and interesting to readers. Any hints as to directions in which improvements may be made will be gratefully received and fully considered, as our earnest desire is to give our readers a journal that, within a short compass, shall be at once thoroughly practical and genuinely scientific.

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The General Election and the Profession.

FROM the strictly medical point of view the substitution of a Liberal for a Conservative Administration can scarcely be expected to be a change for the better. To the Liberal party public health and the medical profession owes little or

nothing ; indeed, although it professedly exists to promote the welfare of the people, it has never shown any adequate appreciation of the direct and vital importance to that welfare of the advancement of medical science, and the reform of sanitary administration. Sir Henry Acland tried his best to interest Mr. Gladstone in such matters, but made no impression on that Protean mind which was "open" in regard to so many questions, including vaccination. We are far from saying that Mr. Balfour's Government has done all it should and could have done in the direction of sanitary improvement. The mention of vaccination recalls a glaring instance of default. With parliamentary battalions, big almost beyond precedent, at his back, Mr. Balfour was afraid to give us a really effective Act. There is no chance of getting this from a Liberal Government, and as a distinct line of cleavage is already noticeable in the Conservative party, it is unlikely that it will return to office with such overpowering strength as it had before.

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The Political Importance of the Profession.

THE profession is feebly represented in the present Parliament, but more might have been done if the medical members had worked together. A Medical Committee was indeed formed two or three years ago, but it was a mere fortuitous concourse of atoms without cohesion. Yet there is a medical group in the French legislature, the members of which consent, when medical affairs are considered, to sink their political differences and unite in furthering the cause which forms their sole bond of union. They control medical legislation as completely as the Scottish Members of Parliament direct law making for Scotland. In the Italian Chambers a similar group has recently been formed, which comprises several men of the highest professional standing. It will doubtless make itself felt as a power within the sphere of medical politics. Surely, with a little tact and public spirit, a body of the same kind might be organised in our Parliament.

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The Small Number of Medical M.P.'s.

THE chief difficulty is the small number of our medical M.P.'s, coupled with the fact that, with two or three brilliant exceptions, they are in a professional sense of no particular importance. The truth is that very few practitioners of medicine can afford the time that must be devoted to parliamentary duties. Many more cannot afford the money—some £500 a year—which the honour and glory of representing a British constituency costs on an average. Of the twenty odd who intend to seek the suffrages of British electors at the coming election, only a handful have more than local fame, and of these one or two are politicians rather than doctors. The proposal to run candidates pledged to the programme of a caucus is so inept as in itself to afford a proof of the incapacity of those who have taken upon themselves to direct the political activity of the profession. The British Constitution knows nothing of the representation in the House of Commons of any particular class; the medical candidates must therefore, like others, stand on a political platform, and their election rests with voters who care nothing for the interests of the profession. Thomas Wakley, indeed, used to be called "The Member of Medicine," but it was not as the advocate of medical interests that he found favour in the eyes of the Finsbury electors. At a time comparatively recent, one of the most justly popular members of the House came within measurable distance of the loss of his seat, because he was accused by some of his constituents of putting the interests of his profession before mere political issues. We see no way of meeting the economical difficulty other than by paying for the representation of our interests, as Labour electorates pay for theirs. It is extremely doubtful, however, whether any candidates could be found who would worthily represent the profession on these terms, and if possible, still more doubtful whether the profession would be willing to guarantee adequate funds for the purpose. And in any case only two or three men could be subvented in this way, and what would they, even supposing that they were men of any standing, be among so many?

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Burdon-Sanderson.

To those who knew the late Sir John Burdon-Sanderson the most wonderful feature in his career is the amount of really good work he managed to do. We are told by the wise that nothing of any value is ever achieved except by concentration. Yet Sanderson's mind always seemed to be elsewhere. It has been said by some of his necrologists that the stories of his absence of mind are myths. This statement, like Mr. Pickwick's views on politics, according to Count Smorltork, "surprise by himself." His absence of mind was open and palpable to feeling as to sight. When he was physician at the Brompton Hospital he used to leave his hat on one bed, his overcoat on another, his umbrella on a third, and his stethoscope anywhere. The objects thus scattered about in his progress through the wards had to be collected by the nurses and clinical assistants who attended him. A coloured lamp was put up in his hall, which he regularly smashed as he burst, wrapt in thought, into the house. At last a large newspaper was hung on the new lamp as a danger signal, but Sanderson insisted that he did not need such a reminder, but would get accustomed to the lamp in time. He took a party of foreign physiologists down to a basement to exhibit some new apparatus. Leaving hurriedly as usual, instead of going upstairs, he ran up a short ladder, on the top of which was a British workman repairing the wall, with the lower part of whose person the professor's head came into violent collision, bringing both to the ground at the feet of the astonished visitors. The story of his boiling his watch while holding an egg in his hand is in La Bruyère's *Caractères*; but there seems to be some foundation for the suspicion that in his laboratory he once lunched on a frog and was afterwards found deeply contemplating a sandwich. He was a lovable man, and his absence of mind made those about him more attached to him. But there can be no doubt that, if he had lived with his head less high in the clouds, he would have done more even than he did for the promotion of the study of scientific medicine at Oxford.

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Amalgamation of London Medical Societies.

At last the combination of the scattered medical societies of London into one strong body, which for years has been advocated in THE PRACTITIONER, seems not unlikely to be realised. The issues now mainly depend on whether the Medical Society is prepared to consent to death for the public good. It must either absorb or be absorbed, and the latter course is virtually being forced upon it by the promoters of the scheme. There is, of course, a third alternative: the Medical Society may refuse to come into the new "combine" at all. This would be a pity, but it is natural that a society which is the oldest and richest in London, which has traditions of its own, and a large record of good work, should hesitate to allow itself to be merged in an entirely new body that, for some time at least, must be of more or less experimental character.

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The Title of the New Body.

THERE is one point in the scheme against which we feel bound to raise a protest. The title proposed: "Royal Society of Medicine," seems to us most objectionable. It might be described in legal terms as a colourable imitation of the title of the Royal Society, and as such its use might fairly be objected to by that body. Even if the Royal Society did not formally oppose, it is well known that there is a faction among its Fellows who would be glad to use the title as a pretext for excluding doctors. To a medical candidate they would say plausibly enough: "You have a Royal Society of your own, that is the place for you." It is to be feared too that the membership of a Royal Society of Medicine might occasionally be used without any very scrupulous care to prevent misapprehension on the subject.

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Coroners and Pathological Experts.

LOOKED at from the point of view of the public welfare, there can be no question that the employment of pathological experts by coroners to help them in determining the cause of death in obscure cases, is a great advance on the haphazard system which treats all practitioners as competent to deal with the difficult problems that not infrequently arise

in connection with that point. It is equally unquestionable, however, that in the great majority of cases which form the subject of inquests, any adequately trained practitioner can give the expert evidence that is required. To set aside the practitioner who has seen the deceased during life, and to insist on the evidence of a pathological expert in cases presenting no difficulty whatever, can only be described as a waste of public money and an insult to the medical profession. We hope that the British Medical Association will be successful in its public spirited campaign against Mr. Coroner Troutbeck. The late Government did not behave well in this matter, for, although the Lord Chancellor admitted that there was at least a *primâ facie* case against the coroner in regard to the manner in which he had exercised his right in calling in expert assistance, he did nothing to check the abuse, and Mr. Balfour, when appealed to, did not reply to the communications addressed to him. It is to be hoped that Mr. Troutbeck will have an early opportunity of explaining how it is that there are so many cases in his district in which the services of a pathological expert are required; and how it is that he relies wholly on the evidence of a gentleman who, whatever his accomplishments in other directions, is not recognised by the medical profession of this country as having attained to any particular eminence as a pathologist.

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The True Inwardness of Osteopathy.

MOST of us know vaguely that osteopathy is a form of American quackery, but hitherto its exact nature has been a mystery. From its name, it should have something to do with bone disease; but, so far as could be gathered from the utterances of its advocates, it appeared to be nothing more than a system of massage. Osteopathy has now found a footing in Glasgow and other places, and therefore a new revelation from the prophet of this cult comes opportunely to enlighten the British mind.

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Explanation of Osteopathy.

DR. A. T. STILL explains that in the intervertebral lurks the root of all our ailments. "At these foramina," he says, "we find the seat of 95 per cent., or more, of the lesions. The lesion

consists of a slip, or sub-luxation of a vertebra, causing a change in the size of the foramen, and consequent interference with the nerves and vessels. This theory has been proven a fact by examination, treatment, and cure of thousands of cases." Dr. A. T. Still defends osteopathy from the charge that it is wrongly named, and shows that it is not by rubbing, but by manipulation of the bones that cures are effected. Dr. A. T. Still admits that even osteopathy cannot save men from death by poison, injury, or old age; but he teaches that "the diseases of which most people die to-day before their time, are due, not to a lack of some sort of pill or tincture, but to the mal-working of some organ, or set of organs, and that this, in turn, is due to mechanical interference with the nerve-supply; and we have found most of these interferences at the vertebral foramina." The theory is simplicity itself; but in practice, is Dr. A. T. Still prepared to affirm that he cures cases of cancer of the breast, pulmonary tuberculosis, or typhoid fever by manipulation of the vertebræ!

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Competitions. THE result of the November Competitions is as follows:—The best essay was sent in by Dr. Thomas Guthrie, of Liverpool; and the best answers by Dr. E. I. Claxton, also of Liverpool. Cheques have, accordingly, been sent to these gentlemen.

Practical Notes.

The Innervation of the Blood-Vessels.—The muscular tissue in the walls of the arterioles is under the control of the central nervous system. The chief centre, called the vasomotor centre, which governs the arterioles, is to be found in the floor of the fourth ventricle. Its lower limit is about 4 mm. above the calamus scriptorius, and it extends upwards for about 3 mm. There are, however, subsidiary centres in the dorsal region of the spinal cord. The vasomotor centre consists of two parts, namely, the vasoconstrictor and vasodilator portions; that portion which seems, however, to be constantly in action is the vasoconstrictor part, and its function is to send down impulses through the spinal cord to the peripheral blood-vessels in order that a mean arteriole tone may be maintained. If the vasomotor centre is destroyed experimentally, or its action, inhibited, as it is when shock occurs, the peripheral arterioles lose their tone to a very considerable extent; they therefore dilate, and the blood-pressure falls. If, however, the spinal cord is divided in the lower cervical region in a dog, and the animal is kept alive, the creature thereby being rendered *spinal*, the blood-pressure falls very considerably at first. After a time, however, the blood-vessels recover their tone, and the blood-pressure once more rises; this is due to the activity of subsidiary vasomotor centres which exist in the dorsal portion of the spinal cord. If the spinal cord is then completely destroyed, the blood-pressure again falls, all the vasomotor centres are destroyed, and there are consequently no centres to maintain arterial tone. The vasomotor centre in the medulla oblongata may be directly influenced by the blood flowing through it. If the venosity of the blood is slightly increased, as it is in the early stages of asphyxia, the blood-pressure gradually rises, but when the venosity of the blood is further increased so that the nutrition of the vasomotor centre is materially interfered with, the blood-pressure gradually falls. The vasoconstrictor part of the vasomotor centre may be directly stimulated, and the blood-pressure increased, by the administration of alcohol, strychnine,

digitalis, and strophanthus. On the other hand, the vasomotor centre may be directly depressed, and with it the blood-pressure, by large doses of alcohol, by opium, chloral hydrate, and belladonna. Afferent impulses which reach the centre in the medulla may modify its action in one of two directions, producing either vasoconstriction or vasodilatation. Most sensory nerves, if stimulated, cause reflexly a general rise of blood-pressure all over the body, but affecting more particularly the blood vessels in the splanchnic area. If, however, the posterior roots of a spinal nerve are divided and the upper cut ends stimulated, the blood vessels of other parts of the body will be reflexly constricted, but those vessels in the organ supplied by the cut nerve roots will be dilated. If, therefore, a limb is injured the vessels of that part are at once dilated in order to provide for a larger supply of blood to the injured area, in order that repair may more readily be effected. This increased blood supply is, however, further aided by the general vasoconstriction of the vessels, and this occurs concurrently in all other parts of the body. On the other hand, if the *depressor* nerve is cut in a rabbit, and the upper cut end is stimulated, the result is that the vasoconstrictor part of the vasomotor centre is inhibited in its action, the peripheral blood vessels dilate, especially those in the splanchnic area, and the blood-pressure gradually falls. This mechanism is also brought into play when the endocardial pressure is too high, the increase of endocardial pressure being sufficient to bring about reflexly a vasodilatation of the peripheral vessels; that is, the peripheral resistance is diminished and the heart can more readily empty itself.

The vasomotor impulses travel down the spinal cord, chiefly in the mixed lateral tract, and there is no evidence of any decussation of the vasomotor fibres. After leaving the lateral tracts of the cord, the fibres get into the grey matter of the cord and arborise around the dendrites of the nerve cells in the lateral horn of the grey matter, which exists only in the dorsal region of the cord. These cells are also probably the local subsidiary vasomotor centres, and give rise to new fibres, which travel to the anterior horn cells, where they again arborise around some of the smaller nerve cells which exist there. These small nerve cells in the anterior cornua in the dorsal

part of the cord give rise to new fibres, which become medullated and pass out as finely medullated nerve fibres in the anterior nerve roots of the cord, that is to say, the vasomotor impulses pass from the spinal cord in the small medullated nerve fibres, which leave the cord in the dorsal or thoracic region. The vasoconstrictor nerve fibres then leave the anterior nerve roots and pass to the nearest sympathetic ganglion, where they lose their medulla; they are known as the white rami communicantes, or preganglionic nerve fibres. On arriving at the proximal ganglion, they form synapses with the nerve cells there. From these cells arise new nerve fibres which have no medullary sheath, these are the grey rami communicantes, or post-ganglionic nerve fibres. They then pass on either to the neighbouring spinal nerve and thence to the peripheral parts of the body, or by the splanchnic nerves to the viscera. The vasodilator nerves pass to the peripheral blood vessels as finely medullated nerve fibres, but the medullary sheath is lost in the distal ganglia.

Most mixed nerves in a limb contain both vasoconstrictor and vasodilator nerves. This may be shown as follows:—If the great sciatic nerve of a cat is cut, and the peripheral end of the cut nerve is stimulated by rapidly interrupted induced induction shocks, the blood vessels in the limb will be found to be constricted, and the blood supply to the limb diminished. If, however, the same end of the nerve is stimulated by slowly interrupted induced induction shocks, the blood vessels will become dilated, and more blood will traverse the limb.

Vasomotor nerves may be paralysed by lesions occurring in the spinal cord, such as acute central myelitis, acute and chronic transverse myelitis, and acute anterior polio-myelitis or infantile paralysis, so that the blood vessels in the paralysed limbs lose their tone, in consequence of which the limbs become blue and cold.

The vasomotor mechanism may be influenced locally, and the blood pressure increased or diminished. The vasoconstrictor nerves may be stimulated directly in the arterial walls by digitalis, strophanthus, or ergot. Local contraction of blood vessels may be induced by the application of cold, or the co-operation of spirituous solutions. Suprarenal extract has a direct action on the peripheral neuromuscular mechanism,

causing vasoconstriction and a rise of blood pressure. Vasodilatation may be brought about locally by the administration of nitrite of amyl, sodium nitrite, belladonna, alcohol, and nitroglycerine. Counter irritants, such as a mustard plaster, turpentine, and the tincture of iodine, cause a local vasodilatation, though reflexly a general rise of the blood pressure. Nicotine, if injected into the circulation of an animal, first causes a slight rise of blood pressure, but this is soon followed by a distinct fall. Extracts of most animal organs, or tissues, cause a fall of blood pressure, though, as stated before, epinephrin, or suprarenin, contained in the extract obtained from the medullary portion of the suprarenal gland, causes a distinct rise in the blood pressure. An extract, obtained from the anterior, or glandular portion of the pituitary body, also produces a slight rise of blood pressure. It is interesting to note that *choline*, a poisonous alkaloid, derived from lecithin, the phosphorised fat contained in the medullary sheath of nervous tissue when it degenerates, causes, if injected into the blood stream of an animal, a marked fall of blood pressure. In general paresis of the insane, nervous tissue is constantly breaking up, especially that on the cerebral cortex; choline is liberated as a result, and may be detected in the cerebrospinal fluid and in the blood. It is possible that this poisonous substance, by its action in lowering the blood pressure, may be one of the causes of the epileptiform, or apoplectiform convulsions, which so frequently occur in persons suffering from this progressive disease.

SHOCK.—It is well known that a severe peripheral injury, such as the division of a large nerve trunk like the sciatic, or a large superficial burn on the body, may lead to the condition known as *shock*. It is very difficult to explain all the phenomena which occur in shock, but it is believed that afferent impulses travel up to the medulla oblongata, which inhibit the activity of the important vital centres there. The cardio-inhibitory centre is influenced, as may be seen by the weak, rapid and irregular pulse, but one of the most marked phenomena is the rapid fall of blood pressure due to exhaustion of the vasoconstrictor part of the vasomotor centre. G. W. Crile

in his article "An Experimental Research into Surgical Shock" shows that if a large mixed nerve is divided, and its upper cut end is stimulated, there will follow a rise of blood pressure; if, however, the stimulus is repeated from time to time, the blood pressure will fall below normal, the blood vessels in the splanchnic area dilate and the blood accumulate there. The consequence of this is that the surface of the body becomes blanched, and the brain is rendered anæmic.

The treatment for shock, therefore, is to raise the arterial blood pressure, and to provide for a flow of arterial blood to the brain. The patient must be placed flat in bed, the foot of which must be raised six inches so that the feet are higher than the head; he must be wrapped in warm blankets, outside of which hot bottles must be placed. Good will also result from chafing the extremities and the abdomen. Twenty to thirty minims of ether should be injected into a muscle, for if so large a quantity of ether as this is injected subcutaneously, sloughing of the skin will probably occur. Smaller doses may be administered under the skin. Brandy in similar doses may also be administered. A hot nutrient enema with half an ounce of brandy should be injected into the rectum. A thirtieth part of a grain of strychnine, combined with a hundredth part of a grain of digitaline may also be given hypodermically. Crile recommends that a solution of adrenalin (1 in 50,000 to 100,000 parts of ·9 per cent. solution of sodium chloride) should be injected intravenously. This should increase arterial tone, and therefore raise the general arterial blood pressure. In some cases of shock, associated with an excessive loss of blood, much benefit follows the transfusion, into the median basilic vein, of at least two or three pints of *warm* ·9 per cent. sodium chloride solution. The effect of this is to raise the blood pressure. In the case of pure shock, however, without the actual loss of blood, such dilution of the blood as must follow the injection of large quantities of salt solution can hardly be expected to aid the recovery of the depressed nerve centres in the medulla oblongata. In these circumstances, it is better to inject the salt solution into the rectum, where it is much more slowly absorbed, and therefore the blood dilution occurs less rapidly. The injection of the salt solution into the rectum should follow in about from a half to one hour after

the nutrient enema. It will be evident, therefore, that the best treatment of pure shock is the administration of cardio-vascular stimulants, in order to increase the general tone of the arterioles, and hence to raise the arterial blood pressure; whereas shock associated with hæmorrhage is best overcome by increasing the volume of fluid circulating in the body by injecting saline solution in the manner already described, and in this way raising the arterial blood pressure. At the same time, however, cardio-vascular tonics, such as those mentioned above, are valuable adjuvants

NOTES FROM FOREIGN JOURNALS.

DECHLORIDISED DIET.

The withdrawal of chlorides from the diet is at present much in vogue for the treatment of dropsy due to Bright's disease and to heart disease, and also for obesity. The idea is that a dehydration of the tissues is brought about, but from whatever cause, the treatment has proved of much benefit in many cases of œdema and ascites. The formation of an appropriate diet has not been an easy task. In a paper read before the recent congress at Liège, and which appeared in *Le Bulletin Médical*, Widal goes very fully into all the details of the appropriate diet.

Bread must be made by the baker without salt; the ordinary French bread has, as a rule, 8 to 10 grammes of salt added for each kilogramme while the finer and daintier makes contain as much as 15 grammes of salt per kilo. There is no difficulty in making bread without salt, or rather without added salt, for the saltless bread necessarily contains the small amount of NaCl present in flour, amounting to 0·70 cg. per kilo.

Meat contains on the average 1 gramme of NaCl per kilo., and is one of the foods which can be eaten most easily without salt. It must always be used fresh, and it can be digested raw, grilled, or roasted, without salt and with butter according to taste. Of the dark meats, beef and mutton are the best to prescribe, and fowl among the white meats.

With *fish*, the choice is limited to the fresh-water varieties, the flesh of which only contains a few centigrammes of NaCl to the kilo. They may be taken fried or lightly boiled. The flesh of salt-water fish contains a large amount of NaCl, reaching, in some cases, 4 grammes per kilo.

Fresh eggs are easily eaten without salt, raw or plain-boiled. An egg contains about 25 centigrammes of NaCl. The yelks are very useful for making sauces, which help to give a relish to insipid articles of diet.

Fresh Butter may be used as freely as the patient likes, and also fresh cream. Saltless cheese may be allowed in small quantity.

Potatoes are an excellent food for the Bright patient. They are easily eaten without salt, boiled or baked, *sauté* in butter to brownness, in salad, or in a purée with milk.

Rice is equally valuable as a food, and the following may also be included in the *régime* :—Green peas with butter or sugar, carrots, leeks cooked like asparagus, endive, lettuce, French beans, celery, artichokes, and salads dressed with oil and vinegar.

The preparation of the various green vegetables requires a little management, if they are to be served up in an appetising way without the addition of salt. The jelly, which cooks call "glazing," can, if made without salt, be used for giving a flavour to different sauces and vegetables. About an ounce to an ounce and a half of this jelly may be used for cooking each day, and additional flavours obtained by the use of tarragon, thyme, bay-leaves, onion, and parsley. It is possible in this way to give a flavour to dishes, so that the absence of salt is quite overlooked. Certain sauces (*Béarnaise*,

Hollandaise, and *mousselline*) which, as a digestive aid, are usually served with meat, fish, and certain vegetables, may be allowed as a treat, on condition that the patient makes a discreet use of his privilege.

Thin vegetable soups are made easily enough, and can be thickened with tapioca, vermicelli, and the like.

Bouillon contains as much as 10, 12, or even 15 grammes of NaCl to the litre, and is, therefore, a regular salt-solution. To its strong chloridisation must be attributed the accidents following its use, which have been noticed again and again in the case of kidney, and of some cardiac affections. Without salt its flavour is far from pleasant, a fact which, to a large extent, deprives it of nutritive value.

Sweet-meats, pastry without salt, and fruit, raw, cooked, or as jam, can be given freely. Chocolate is an excellent food and has an additional advantage in that in every 100 grammes (*Gautier*) it contains 0.67 gr. of theobromine, which is considered to be an excellent dechloridising agent.

For *drink*, a litre and a half to two litres of water should be taken daily, but the water may be replaced in part by mineral waters, which do not contain more than a few centigrammes of NaCl per litre. Sugar, lemon, or syrups may be added to the water according to taste. Tea, coffee, and beer, which contain a negligible amount of chlorides and are slightly diuretic, can be taken in moderation. Wine, so long and so strictly prohibited to the kidney case, does not appear to produce the least disadvantage when taken in moderation.

The effect of the diet can be noticed on the first day by the decrease in weight, which proceeds steadily, but much more quickly when the patient is kept strictly to bed. With the disappearance of œdema, the patient returns to a more active life and develops a big appetite. The proportions of meat, bread, and vegetables must be increased in order to provide freely for a "living-ration." It is often surprising to observe the ease with which the *régime* becomes established, especially if the little culinary devices have been pointed out, whereby, for certain foods, the absence of the savour of salt can be concealed. The diet can be arranged to suit the taste of each patient, and yet answer the requirements of the treatment.

Medical treatment can be associated with the *régime*. Sudorifics do not eliminate any chlorides, while purgatives eliminate comparatively few only. Of diuretics, squills and nitre have an insignificant effect; acetate of potash in two to three drachm doses is active but uncertain; theobromine is the most efficient diuretic and dechloridiser. Digitalis increases the action of theobromine, but has no effect by itself in renal or cardiac cases, though its action on the heart in the latter class often promotes free diuresis.

ADRENALIN IN ASTHMA.

The *Therapeutic Gazette* (Oct. 1905) quotes, with approval, an article in the *Memphis Medical Monthly* on the results obtained by the use of adrenalin in asthma; one of the most inexplicable, from a physiological point of view, in the whole range of therapeutics, but of real and accredited value. Five to ten minims of solution of adrenalin (1 in 1000) injected

subcutaneously, give practically instantaneous relief in the paroxysms of asthma, acting as if by magic. How so powerful a vasomotor constrictor as adrenalin acts on the walls of bronchioles, which are themselves, as we imagine, already contracted by the action of vasomotor constrictors, must be left for explanation until such time as the pathology is more fully known. The practical, albeit empirical like so much else in medicine, point is that morphia can now be dethroned from its place by a more efficient successor, and one, moreover, which is free from the dread prospect of the terrible habit, an inestimable boon to patient and physician alike.

THE TREATMENT OF THE MORPHIA-HABIT BY HYOSCINE.

Bering writes in the *Californian State Journal of Medicine* on this subject, as he is convinced by practical experience that he has something better to offer the medical profession than the despondent treatment, which is all that is suggested in the principal text-books. He claims that by the use of hydrobromate of hyoscine, in accordance with the plan of treatment he has adopted, any physician can rid his patient of this curse in a very short time without the least danger. The sudden withdrawal of the drug occasions no cardiac failure, cramps, vomiting, or any other of the symptoms usually observed. Treatment in a hospital, or nursing home, is essential, for the patient must be visited frequently by the physician, and must be removed from the influences of home and friends. The room must be darkened as light causes eye troubles, and it should be as free of furniture as possible, because of the hallucinations due to the hyoscine. Thoroughly trained and absolutely trustworthy nurses are necessary, for the patient must not be left for one moment while the hyoscine is being administered, nor for the first twenty-four hours after the last dose has been given.

The condition of the heart, lungs, and kidneys should be ascertained before beginning the treatment; but heart and kidney affections are no bar to successful results, if proper care is exercised. The system is cleansed of all toxic materials, so far as possible, by means of a vapour bath, to ensure free action of the skin, and by calomel, podophyllum, ipecacuanha, &c., with $\frac{1}{32}$ to $\frac{1}{8}$ of a grain of sulphate of strychnia, given every two hours for three or four doses, and followed up in six or eight hours with a saline purgative. A large amount of relief is afforded by these means to the system in general, and to the portal system in particular. The administration of hyoscine can then be begun, and it is given in doses ranging from $\frac{1}{1000}$ of a grain every hour to $\frac{1}{300}$ of a grain every four hours until the full physiological action of the drug is obtained. This is shown by a fall in the pulse-rate of from 10 to 15 beats, flushing of the face, dilated pupils, dryness of the throat, muttering delirium, picking at imaginary objects, and other hallucinations. Only enough hyoscine is then given to keep the patient in this condition for from thirty to forty hours. Bering allows his patients to come round at the end of thirty hours, and if he finds them free from pain and with no desire for morphia, the hyoscine is stopped; but, if such is not the case, the treatment is resumed for a further period of twelve or even twenty-four hours. At the

end of this time, the morphia-craving is completely abolished, and recuperative treatment is instituted. By the second or third day the appetite has become enormous, calling for five or six meals a day to appease it. If, as is often the case, the patient goes off to sleep, after the first dose of hyoscine, no more is given until he wakes; and, on the other hand, if wild delirium sets in, the drug must be pushed, even to the extent of $\frac{1}{100}$ of a grain every half-hour until quiet is restored. Pain at any time is an indication for the exhibition of more hyoscine. Delirium may result from excess of hyoscine, in which case the drug must be withheld until the patient is free from its influence, and then resumed in small doses, given at longer intervals. Patients come round pretty rapidly, and are soon perfectly rational and quite cheerful. Cardiac stimulants are seldom necessary if the preliminary eliminative treatment has been thoroughly carried out; but in case of need the use of sparteine sulphate, in doses of $\frac{1}{2}$ to $\frac{1}{4}$ of a grain, every four or six hours, is all that is required. (*Therap. Gazette;* October, 1905.)

A SIMPLE AND EFFECTIVE CURE FOR GANGLION.

The best treatment for ganglion—safe, simple, and effective—is camphophenol, prepared by mixing together equal parts of camphor and crystalline carbolic acid. A white, rather oily, liquid is formed, smelling of camphor, non-toxic and non-corrosive. Fifteen to twenty minims of this liquid are injected directly into the ganglion by means of a hypodermic syringe. The skin over the ganglion should be thoroughly cleansed beforehand. Some swelling results, but soon subsides; but the limb should be rested for a few days on a splint or in bed. One injection suffices for cure.

Camphorated phenol has been included in the United States Dispensatory for some years, and consists of two parts of camphor to one of carbolic acid. It can be applied to sound skin, wounds, and mucous surfaces, such as mouth, nose, and vagina, or to abscess cavities in full strength and without inconvenience. It has been largely used in surgical and gynæcological practice at the Presbyterian Hospital, Philadelphia, with excellent results in all cases. (*Therap. Gazette,* September and October, 1905.)

HYDROXYL AS A MILK-PRESERVATIVE.

E. Baumann reports in the *Münchener medizinische Wochenschrift* (No. 23, 1905) the results of his investigations, carried out under Fraenkel at the Hygienic Institute of the University of Halle. He points out that milk obtained from diseased cows can give rise to infection from tuberculosis, anthrax, and foot-and-mouth disease, and perhaps also glanders, small-pox, and rabies. Further pollution from outside may spread abroad enterica, cholera, dysentery, scarlatina, diphtheria, &c. The different bacilli can certainly be almost completely destroyed by Pasteurization, or by sterilization; but, at the same time, the heat kills, or materially injures, the enzymes and ferments of the milk; and the same is the case with all bactericidal agents. Heat, however, has a further unfavourable effect on the contents of the milk, the soluble albumins (globulin and albumin) and lecithin, and also on its coagulability by the rennin ferment, while the milk-sugar is partly converted into caramel. The taste and colour of the milk are altered, and it gives up its resisting power to decomposition. Toxic

products, such as sulphuretted hydrogen, can be formed through the decomposition of albumen; the fat loses its condition of minute emulsification, being, consequently, absorbed with more difficulty; finally, the peptonising bodies form toxins, or favour putrefaction.

Cold has been used for preserving milk, but the product is not by any means free from objections. Chemical methods have been tried in great variety, such as soda, boric acid, borax, salicylic acid, sulphate of soda, bichromate of potash, hexa-methylene tetramine, &c. Von Behring lately recommended the addition of formalin to milk in the proportion of 1 to 25–40,000. Pathogenic germs (those of enterica, dysentery, and cholera) are not, however, completely killed by means of this addition, while the albumen bodies are altered and the rennet enzyme materially injured, so that the curd-formation is practically annulled. In addition to the effect on the milk, the long continued use of chemicals acts injuriously on the health of infants and children, and the sale of milk, preserved by these methods, has been forbidden in Germany by ministerial decree.

An agent, which sufficiently sterilizes milk for all practical purposes, keeps it fit for use for eight to ten days, and is at the same time quite harmless in itself, is peroxide of hydrogen. It has been recommended by Heidenhain for years past, and Budde published the procedure a short time ago. The milk is warmed to 48° to 50° C. (118° to 122° F.) with 0·35 per thousand of H_2O_2 added; it is kept stirred at this temperature for half-an-hour and then heated to 52° C. (125·6° F.) for two or three hours. Milk treated in this way keeps at least eight to ten days without curdling, the pathogenic germs are killed, and its digestibility is in no way injured.

Baumann found that the addition of H_2O_2 in small quantities to milk completely kills the bacilli of enterica, cholera, and dysentery. If the amount of H_2O_2 falls below 0·35 per thousand, or if the milk is only warmed to 20° C. (68° F.), only reduction of the germs in number happens. Tubercle bacilli are destroyed by the same means. The hydroxyl is completely resolved into H_2O and O, but if the amount per thousand reaches, or exceeds, 0·54, some remains unchanged. The decomposition of H_2O_2 does not result through the enzymes of the milk, but is brought about by the numerous microbes present. The coagulation due to rennin is only changed by H_2O_2 in that its appearance is delayed; the curd formed is finely flaked. Peptic digestion appears to take place more quickly and more energetically in the case of milk treated with H_2O_2 than with raw milk. The flavour is in no way affected. H_2O_2, therefore appears to be well suited for milk preservation; the addition should be made directly after milking.

EPISTAXIS.

The best treatment of epistaxis is cauterisation of the small ulcer, which gives occasion for the hæmorrhage. If this cannot be done, plugging the nostril through the anterior nares should be carried out. An Italian surgeon, quoted by the *Bulletin Médical*, recommends that into the nostril, whence the bleeding is taking place, should be introduced a small pledget of cotton-wool, soaked in the following:—

℞. Solution Adrenalin. (1 ‰).
Solution Sodii Chlorid. (7 ‰) - - - āā ʒiij. M.

Should this not suffice to stop the bleeding, the nostril must be packed through the anterior nares with strips of sterile gauze. In nearly every case this will stop the hæmorrhage, and the classical plugging through the posterior nares needs only to be resorted to very exceptionally. For removing the tampon, Mendini advises the instillation into the affected nostril of a few drops of this solution:—

℞. Cocain. Hydrochlor. - - - - gr. jss.
Solution Adrenalin. (1 °/₀₀) - - - - ♏xv.
Aq. dest. sterilisat. - - - - ʒiij. M.

Time must be allowed for this liquid to soak through the plug, which can then be withdrawn as a whole with ease, as the cavity of the nostril will have become appreciably increased in size from the constricting action of the adrenalin upon the tissues of the walls. To prevent recurrence, the patient should make use of the following ointment for a few days, introducing a small piece into the nostril:—

℞. Solution. Adrenalin (1 °/₀₀).
Ol. Vaselini - - - - - āā ♏xv.
Zinci Sozo-iodolat. - - - - gr. xv.
Cocain. Hydrochlor. - - - - gr. jss.
Lanolin. - - - - - - ʒiij. M.

The solution of adrenaline and the oil of vaseline must be intimately blended before adding the other ingredients.

Borde, quoted in the *Journal de Médecine et de Chirurgie pratique* (25 October, 1905), pays particular attention to the introduction of the tampon, which he forms by wrapping a band of absorbent or boric wool tightly round one leg of a pair of scissors for a distance of two inches from the point. In this way the tampon has a conical shape, and the leg of the scissors (a tapering penholder will answer as well) can then be easily withdrawn. Before it is inserted into the nostril, it is soaked in some hæmostatic or antiseptic solution, or, if need be, in plain water, and the excess well squeezed out, leaving the plug damp, fairly stiff, and flat, so that it can be pushed into the nasal fossa with ease and as far as wished. When in place, the outer end is moistened with water in order that the plug may swell up by imbibition along its whole length, and thus gently compress the mucous membrane. The patient is then made to sit with the head bent forward, so that the blood which has just issued may clot in contact with the tampon, which is left in position for 24 or 48 hours, and is usually removed with the greatest ease.

Reviews of Books.

Simple Lessons on Health for the Use of the Young. By Sir Michael Foster, K.C.B., M.P., &c. London: Macmillan & Co. Pp. 116. Price 1s.

This little book contains four so-called lessons on Fresh Air, Food and Drink, Light, and Cleanliness, and has been written with the very laudable desire to impart sound and useful instruction to the young, and, by inference, especially to the young in our public elementary schools. While the main facts of the lessons are indisputable, and should be impressed upon the minds of all young people, and, for the matter of that, of all older people too, we cannot congratulate Sir Michael Foster upon the style in which these lessons are written. There is an attempt to be simple, but we cannot approve of such abbreviations as "can't," "don't," still less of "won't," nor of such expressions as "try and live," and "there are sure to be a lot of things." Statements of fact may sometimes be usefully repeated for the purpose of impressing them upon the memory, but when the repetition is frequent, it is apt to become wearisome. This fault is especially noticeable in the lesson on food and drink.

We sincerely sympathise with Sir Michael Foster in his attempt to impart some sound and practical knowledge in an intelligent and very temperate way; but we do not think that he is very successful in the rôle of an elementary or secondary school teacher.

Modern Clinical Medicine. Infectious Diseases. Edited by J. C. Wilson, A.M., M.D. London: Appleton & Co. Price 25s.

This volume is an authorised translation by Prof. Salinger from that standard work, *Die Deutsche Klinik*, of the sections dealing with infectious diseases. The foremost German clinicians have contributed to that volume, and the result is an authoritative presentation of the latest views in medical science. A compilation by different authors has the inevitable drawback of too frequent repetition, and there are minor discrepancies; but these are more than counterbalanced by the advantages of a greater specialisation, and of variations in the methods of description. From the number of excellent contributions, it is perhaps invidious to single out one for special notice, but the article on "Malarial Diseases" by Prof. Löffler must be mentioned as a thoroughly comprehensive and scientific account of this fascinating subject. Widely different in style from the above is the study on "Sepsis" (Septicæmia) by Prof. Jürgensen, in which a series of illustrative cases is detailed with a valuable summary of the leading points in diagnosis. For a text-book, this work is hardly suitable, since the subjects are treated with that minuteness, characteristic of German methods, but as a volume for frequent reference, it can be cordially recommended. The editor somewhat naively remarks in his preface that no attempt has been made to modify the translator's rendering into English. The book, however, is much more readable than this admission would seem to imply. It is true that in many cases, the text follows the foreign idiom far too closely, and the meaning is not made clearer to English readers by the introduction of choice "Americanisms."

A System of Clinical Medicine. Dealing with the Diagnosis, Prognosis, and Treatment of Disease. For Students and Practitioners. By THOMAS D. SAVILL, M.D. (Lond.), Physician to West End Hospital for Diseases of Nervous System, Physician to St. John's Hospital for Diseases of Skin, London, Volume II. Certain General Disorders; Diseases of the Skin and the Nervous System. Pp. x and 447. 2 plates and 65 illustrations. London: J. & A. Churchill.

IN this the second volume, Dr. Savill completes his task, dealing first with general disorders in which the chief symptoms are debility, pallor, and emaciation. This includes the various forms of anæmia and of leukæmia, myxœdema, and Addison's disease, &c. Next to be considered are symptoms referable to the extremities, including gout and rheumatism, and the protean manifestations of these diseases. Following this are excellent chapters, dealing with diseases of the skin, and subsequently diseases of the nervous system. The volume closes with a practical chapter on the examination of pathological fluids and clinical bacteriology. This last, like all the practical matter in the book, is well and clearly put, easy to follow, while nothing of importance is omitted.

Treatment is perhaps the least developed part of the book, though a good deal of attention and care has evidently been devoted to it; but this is a matter that always suffers when condensed.

There are one or two matters which might be considered in a new edition, chiefly the rather too frequent use of small print—very small in places—and the correction of manifest inaccuracies like the following. On page 760, in a reference, G. Bellingham Smith appears as E. Billingham Smith, and J. W. Washbourn as Washbourne. On page 761 Dr. S. E. Herman should be G. E. Herman.

A Text-book of Legal Medicine. By FRANK WINTHROP DRAPER, A.M., M.D. (Harv.), Professor of Legal Medicine, Harvard University, Medical Examiner for the County of Suffolk, Mass.; Medico-legal Pathologist, Boston City Hospital. Pp. 573. 6 plates, 34 illustrations. Philadelphia, New York, and London: W. B. Saunders & Co.

WRITTEN by an acute, accurate, and trained observer, this book embodies the ripe practical experience garnered in the course of twenty-eight years' service as Medical Examiner for the City of Boston. It contains no toxicology, nor does it deal with the medico-legal relations of psychiatry, since both these subjects have, in the author's opinion, acquired an importance calling for independent treatment.

The book is essentially that of a practical man, and, moreover, of one who is thoroughly conversant with all the best work which has been done in connection with his subject. The information is clearly and concisely given, and the happy medium course is steered between the Scylla of excessive verbosity on the one hand, and the Charybdis of undue compression on the other.

The leading principle that a medical witness must confine himself strictly to facts of observation is insisted on throughout, and the author's aim is that no fact, however small, shall escape sufficient notice. The closing chapter describes in detail how a medico-legal autopsy should be carried out, and is clear evidence that the author himself is a skilled and

most accurate observer, whose method of procedure leaves nothing overlooked in the least degree. In addition to this, he is fortunately endowed with the none too common gift of being able to impart his meaning and teaching to others thoroughly and efficiently.

The Effects of Tropical Light on White Men. By Major Chas. E. Woodruffe, A.M., M.D., Surgeon United States Army. London: Rebman Ltd. Pp. 358. Price 10s. 6d. net.

This work is the outcome of a full consideration of von Schmaedel's theory of skin-pigmentation, in the light of practical experiences of tropical life gained during service in the Philippines. The theory is that skin-pigmentation was evolved for the purpose of excluding the actinic rays of light, which are known to be capable of destroying living protoplasm. The author set himself to work to test the correctness of this theory, and found that he had to range over a very large field without much result. He succeeded in bringing together very convincing testimony that the theory is firmly based upon fact, and has produced a work of very great interest.

The consequences arising from an acceptation of the truth of this theory are far-reaching, and will certainly modify very materially the course of action in respect to light, not only of tropical residents, but also of dwellers in the temperate regions.

There are evidences of carelessness in the composition and revision of the book, which should be corrected in a future edition, should one be required.

Important statements such as that relating to an alleged increase of neurasthenia among the officers of the Royal Navy, should have some better and more definite authority than "it is reported." Another and graver instance is where "Press dispatch" is quoted as the authority for a long paragraph on the gravity of the extraordinary increase of insanity in England, and the rapidly growing percentage of feeble-minded children born.

Carcinoma of the Rectum, its Diagnosis and Treatment. By F. Swinford Edwards, F.R.C.S., Senior Surgeon to St. Mark's Hospital for Diseases of the Rectum, and to St. Peter's Hospital for Urinary Disease; Surgeon to the West London Hospital. London: Baillière, Tindall, and Cox. Pp. 47. Size, Demy 8vo. Price 2s. 6d. net.

In this short monograph, the author places before the profession his own experience in the operative treatment of malignant disease of the rectum, which is based upon forty consecutive cases. There is an interesting table of these cases, which gives, so far as possible, the results of the *trans-sacral excision of the rectum*—an operation which the author strongly advocates. It is interesting to note that Mr. Edwards has not met with a single case in which the disease was extensive enough to demand the more severe *combined abdominal and trans-sacral operation*. The book is well written and is very practical.

Tumours of the Cerebellum. By Drs. C. K. Mills, C. H. Frazier, G. E. de Schweinitz, T. H. Weisenburg, and E. Lodholz. New York: A. R. Elliott Publishing Company. Pp. 179. Figs. 8.

This small volume contains a concise account of cerebellar tumours. The opening chapter deals with the important symptoms observable in the

diagnosis of these tumours, and contains some pointed remarks upon their surgical aspect. The authors insist upon early removal, with which we entirely agree. The special chapter upon the ocular symptoms of cerebellar tumours is exceedingly good, and may be commended to all neurologists, and to ophthalmic and aural surgeons. One chapter is devoted to their pathology, while the final one treats of the functions of the cerebellum. We can only wish that the last-named was more complete and exhaustive.

Outlines of Physiological Chemistry. By S. P. Beebe, Ph.D., Physiological Chemist to the Huntington Fund for Cancer Research, and B. H. Buxton, M.D., Professor of Experimental Pathology, Cornell Medical College. New York: The Macmillan Company. Pp. 195. Price 6s. 6d. net.

It is well known that the subject of physiological chemistry is one in which great advances have recently been made, and new facts are continually being brought to light. The present volume, in a most concise way, lays before the student of physiology the chemistry of those important reactions which more particularly concern him, and we cannot but believe that all workers in physiological chemistry will welcome it. The chapters dealing with the chemistry of the proteids and enzymes are particularly good, and are worthy of careful study.

The Thyroid and Parathyroid Glands. By Hubert Richardson, M.D., Demonstrator of Physiological Chemistry, University of Maryland Philadelphia: P. Blakiston, Son & Co. Pp. 257. Figs. 77.

As is well known, during recent years great strides have been made in our knowledge of the functions of some of the so-called ductless glands. Especially is this the case in connection with the thyroid gland. The present volume is an elaborate treatment of the whole subject of the thyroid gland, including its embryology, physiology, chemistry, and morbid conditions. The last chapter deals exclusively with thyroid feeding in general therapeutics, and describes, as nearly as possible, its action in connection with these. The writer of the book is to be congratulated upon its completeness. He has had many opportunities for making personal observations and researches in connection with the thyroid gland, and seems to have used them to the greatest advantage. The production of this useful work is the result of his labours.

Novelties and Notices.

TABLOID RHUBARB EXTRACT.

(Messrs. Burroughs Wellcome & Co., London.)

This product is made from "Wellcome" Brand extract of rhubarb, which is the result of a special process whereby the full therapeutic value of rhubarb is retained. The "tabloids" are very efficacious and palatable. Each contains 2 grains of the extract, and one to three may be swallowed with a little water after food. The "tabloids" are issued in bottles of 25 and 100.

TINCTURES OF STROPHANTHUS AND SQUILL.

(Messrs. Evans, Gadd & Co., Exeter and Bristol.)

These two preparations have been submitted to the trustworthy bio-chemical tests for drugs in the Pharmacological Laboratory of the University of Cambridge. The minimum lethal dose of the tincture of strophanthus for a 20-gramme frog is a quarter of a minim, the lethal dose of the tincture of squill for a 25-gramme frog is 3 minims. This shows that both these drugs have a very effective action on the heart. The medicinal dose of each of these drugs is that given in the Pharmacopœia, namely, 5 to 15 minims.

COLĀLIN AND COLĀLIN LAXATIVE.

(Messrs. T. Morson & Son, Gray's Inn Road, London.)

Colālin is cholalic acid, one of the constituents of the bile. This amorphous white bitter powder is put up in tablets; and it is believed that it undergoes no change in the stomach, but is absorbed from the upper part of the small intestine. It is a direct hepatic stimulant, causing an increased flow of bile. The colālin laxative is a combination of colālin with the anthraquinone principle of cascara, and it is a hepatic stimulant with a mild cathartic action. Colālin is obtainable in $\frac{1}{2}$-grain, $\frac{1}{4}$-grain, and $\frac{1}{8}$-grain tablets, and in powder form for prescribing. Colālin laxative is in $\frac{1}{2}$-grain tablet form.

STERILOID MILK.

(The British Steriloid Company, Ltd., Dublin.)

This new preparation—steriloid milk—is a white powder, which is reported to be prepared from pure, unskimmed, cow's milk. We find that there is no added matter, and nothing but water has been eliminated from the original milk. The best mode for its use in a liquid state is to dissolve 1 ounce of the steriloid milk in 8 ounces of boiling water. In its dry state it will keep indefinitely under any climatic or atmospheric conditions.

ANDOUARD'S BEEF IN POWDER.

(Messrs. E. J. Reid & Co., Basinghall Avenue, London.)

The Andouard beef powder represents selected beef, deprived of its 80 per cent. water, and reduced to a powder by a special process invented by Professor Andouard. It contains albuminous matter, 78 per cent.; fat, 8 per cent.; mineral salts—chiefly phosphates—4 per cent.; water, 8 to 10 per cent. It is a grey powder with a neutral odour and agreeable taste. It is readily digested, and may, therefore, be recommended to consumptives, to the debilitated, to convalescents, and to those suffering from diseases of the digestive organs. A well-filled tablespoonful of this powder is said to correspond with more than 100 grammes of fresh meat.

CHOCOLATES AND COCOA.

(Messrs. Cadbury Bros., Bourneville, Birmingham.)

Messrs. Cadbury Bros. have again forwarded samples of their much appreciated specialities. Among these, we notice "Dairy Milk Chocolate"—a new sweetmeat which has a distinct nutritive value and possesses sustaining qualities; this should become very popular. The fancy boxes containing assorted chocolates are works of art, and the contents quite up to the high standard of excellence which has been set by this firm.

ANSWERS TO QUESTIONS IN OCTOBER, 1905, NUMBER.

I. The term Ozæna signifies in its literal meaning a stench, but is used as a synonym for chronic fœtid rhinitis. The term Ozæna, however, has been applied to many ulcerative nasal conditions in which fœtor is a prominent symptom.

The trouble usually begins in early life, *i.e.*, from about the tenth to twentieth year. On this ground it has been suggested that it is due to a congenital defect of the intra-nasal structures. It is, however, seldom found under four years of age, and is most commonly found to commence about puberty. Females are affected in a far greater proportion than males (7 to 2). Defective health is frequently found in those who suffer from the disease, such as anæmia, chlorosis, and the strumous diathesis. It does not appear to be contagious. In some cases there appears to be a distinct hereditary predisposition to the affection in certain families, where two or three members may be affected at the same time. The cause of the extreme offensiveness is stated to be due to the action of the specific micro-organism, the Bacillus fœtidus ozænæ discovered by Hajek; the cultivation of which outside the body reproduces the characteristic fœtor. It has been suggested that this organism is the cause of the disease; but, on the other hand, it has been maintained that the organism is only to be found as a sequel to the atrophic changes which take place in the nasal structures. Thus, so far as our knowledge extends at the present time, we can only affirm that at the period of development certain changes of an atrophic character take place in the intra-nasal structures which lead to the formation of crusts, the decomposition of which, under the action of the specific Bacillus of Hajek, gives rise to the intense fœtor, and to which the term Ozæna is applied.

II. Ascites signifies an accumulation of fluid of a serous character in the peritoneal cavity. The causes may be divided under two headings—(*a*) local, (*b*) general.

(*a.*) *Local Causes.*—(1.) Direct mechanical obstruction of the portal circulation. This may occur:—(i.) Along the trunk of the portal vein outside the liver, *i.e.*, enlarged glands in the fissure of the liver, tumours or prominences of the liver, tumours in neighbouring organs (especially pancreas), hepatic aneurisms, perihepatitis, and, finally, inflammation or calcification of the portal vein. (2.) By pressure upon or obliteration of branches of the portal vein within the liver. This is most frequently seen in ordinary alcoholic cirrhosis of the liver, but occasionally also with syphilitic cirrhosis or infiltrating cancer. Among this also should be included the atrophic form of nutmeg liver.

(ii.) Morbid conditions of the peritoneum and abdominal tumours.

Amongst this class are to be included ovarian tumours, malignant growths affecting the peritoneum, and the enlarged spleen associated with leukæmia and malaria, tuberculosis.

(*b.*) *General Causes.*—(I.) Ascites may be associated with chronic cardiac disease, emphysema, and sclerosis of lung. In these cases there is a general impediment to the venous circulation, and the ascites is usually a secondary event following on œdema of the legs and general anasarca.

(II.) Bright's disease may at times be associated with ascites, the latter then being part of the general dropsy, the amount of fluid present in the abdominal cavity in these cases being small.

(III.) Finally, fluid may collect in the peritoneum as a result of rupture of a cyst (hydatid or ovarian). The rapid cure of chronic cutaneous affections, or the sudden suppression of habitual discharges, an extreme anæmia, are all stated to be a cause of ascites.

III. The main factors in a history of this case can be summed up as follows:—A man, aged 55, in the occupation of clerk, of chronic alcoholic habits, and with a family history of gout, has persistent occipital headache, failing eyesight and pain in his legs. He has had one fit, in which he bit his tongue, and was unconscious for 20 minutes.

Such a history, in combination with the present state quoted in the question, points to (1) some intracranial disease of a gross organic nature, or (2) to a toxic condition leading to cerebral symptoms.

Now the various conditions which would at first sight give rise to such a symptom-complex are: cerebral tumours, general paralysis of the insane, cerebral meningitis, cerebral abscess, and cerebral softening; whilst under the toxic groups can be placed chronic nephritis.

We will now discuss the various symptoms in detail, and attempt by a process of exclusion to arrive at a true diagnosis of the case.

Persistent headache may be common to every one of the above-mentioned diseases, but amongst all these suboccipital headache is perhaps most frequently found as one of the lesser manifestations of uræmia.

Failing eyesight is frequently present in general paralysis and nephritis, but is most frequent in cerebral tumours, abscess, and meningitis. The quasi-epileptic seizure which he had might have occurred in practically all of the diseases. Now, in favour of *general paralysis*, we have, beside the headache and failing eyesight and the single fit, the twitching facial muscles, the hesitating speech, and the increase in the knee jerks. But, in opposition to these points, that, though the pupils are unequal (a point in favour of general paralysis), they react to light and accommodation. The subsequent history, too, of the case is very rapid for one of general paralysis, and no mention is made of any mental changes which one would naturally expect.

Cerebral Tumour.—Headache, defective vision, a fit, inequality of pupils, altered speech, and vomiting, may all lead to the diagnosis of tumour.

But here, again, we are met with difficulties, for we have no statement as to the nature, if any, of the retinal changes, nor is there mention made of any signs of a localising nature which would point to the position of such tumour, should it exist.

The same remarks will apply to *abscess.*

We have now to consider the question of *meningitis*, and practically the only types to be considered would be the syphilitic and tuberculous. Against syphilitic meningitis is the very rapid progress of the disease as well as the fact of the absence of cerebral nerve palsies.

Tuberculous meningitis, likewise, in the general course of its progress, presents a widely different picture from the case under consideration.

Finally, we are left to consider *nephritis*. At once we conclude that in all probability organic disease of the kidney is present, for we learn that the urine is of low specific gravity and that it contains a small quantity of albumen, but no mention has been made of any examination for casts. The fact that sugar is present in small amounts does not of a necessity indicate diabetes, but can be easily explained by the ingestion of large amounts of alcohol. Then, again, we have the confirmatory evidence of the degeneration of his arteries and of the increased arterial tension. And although the heart sounds are stated to be normal, yet it does not negative hypertrophy, which we would expect to be present. Furthermore, many, if not all, of the symptoms which are seen to be present in the course of his illness can be attributed to the onset of uræmia. Headache, especially occipital, is common. Failure of eyesight and even sudden amaurosis may occur in uræmia, without any discernible changes in the retina, apart from albuminuric retinitis.

Convulsions, too, are invariably present in severe uræmia, vomiting and restlessness, which were present in the later stages, are very common symptoms in uræmia. The hesitating speech, the twitching muscles, could be explained as the result of degenerative changes in the cerebral cells, and also of the chronic alcoholic poisoning associated with deficient nutrition depending on vascular disease. And, therefore, one can come to the conclusion that the cause of death was uræmia supervening upon chronic interstitial nephritis.

Post-mortem Examination.—The kidneys would be slightly smaller than normal, capsules adherent, cortex thinned, the section of the cut kidney showing many bleeding points, and in the cortex might be seen a few cysts scattered about. The renal vessels would be widely dilated. The heart would in all probability show hypertrophy of the left side. The vessels of the brain would be found atheromatous, and the cerebral substance probably sclerosed. Finally, in all probability, fatty and fibroid changes would be present in the liver.

COMPETITIONS.

We offer our readers every month two Prizes on the conditions stated below.

A Prize of Two Guineas will be given to the author of the best Essay on a subject to be announced by the Editor.

A Prize of One Guinea will be given to the competitor who writes the best answers to three questions relating to Medical or Surgical Cases.

Results of the December Competitions will be announced in the February number.

a.—The Subject of the Essay for January will be

The Treatment of Aneurism of the Innominate Artery.

b.—Answers to the following questions are invited :—

1. What complications may follow varicose veins in the leg?

2. What are the indications for stretching the great sciatic nerve?

3. A woman, forty years of age, came under treatment for intense abdominal pain and irregular fever. For the last two years, previous to which she had good health, she has had abdominal pain coming on after food which was relieved by vomiting. Recently, she had two severe attacks of pain in the abdomen which were associated with sickness. One attack ended suddenly, the other subsided gradually. The patient had symptoms of dyspepsia and discomfort in the upper part of the abdomen; she was well nourished. Three days before coming to the hospital, the patient noticed, in the right hypochondrium, a lump which gradually increased in size, reaching to the umbilicus; it was very tender. The temperature was 102·5°. The bowels were confined; there was some vomiting and an icteric tint. The patient was obviously ill. What is your diagnosis of the case, and what treatment would you adopt?

GENERAL CONDITIONS.

A.—All MSS. relating to the Essay must be marked on the top left-hand corner "Essay," and must be sent to the Editor of The Practitioner, 149, Strand, W.C., on or before the 1st day of February, 1906. The answers to the above Questions must not exceed eight hundred words, and the best answer will be published in due course.

B.—All MSS. giving answers to the Questions must be marked on the top left-hand corner "Questions," and must be sent to the Editor on or before the 1st day of February, 1906.

C.—No Essay will be returned unless a special request is made, accompanied by a stamped addressed envelope.

A and B.—(1) One side of the paper only must be written on.

(2) The name or pseudonym, and address of the competitor must be clearly written on each sheet of paper used.

(3) The decision of the Editor is final.

(4) Competitors must be registered General Practitioners.

(5) The attached Coupon must be filled up by each competitor.

THE PRACTITIONER.

FEBRUARY, 1906.

THE NORMAL DAILY TEMPERATURE VARIATION AND ITS MODIFICATIONS IN PULMONARY TUBERCULOSIS.

By J. J. GALBRAITH, M.D.,

Research Scholar, Royal Victoria Hospital for Consumption, Edinburgh.

THE normal body temperature in man and in warm-blooded animals exhibits universally a diurnal variation, the temperature being highest in the evening towards the end of the period of physiological activity, and lowest in the early morning towards the end of the period of rest. Alteration in the character of the temperature variation, and of its mean height during the twenty-four hours, is a characteristic of many diseases, but in none are its manifestations so varied as in pulmonary tuberculosis.

The normal temperature variation is an attempt to balance exactly heat production and heat dissipation. Heat production is the result of metabolic changes taking place in the body consequent on physiological activity of the various organs. Physiological activity in many organs is obviously intermittent in degree, so that the amount of heat production must also be intermittent. The balance is preserved by a nervous mechanism, which acts on the body temperature chiefly by influencing heat dissipation. While this is its method of operation, within certain limits, it may also act on heat production. In certain circumstances, the heat regulating mechanism compensates for extreme cold, by the induction of tremor or shivering. This occurs involuntarily when the body temperature falls below a certain point. In the presence of an outside temperature of about 0° Centigrade, shivering is in some animals capable of preventing further fall of the temperature. If, however, it is prevented from occurring by deep narcosis, the resulting fall in temperature does not differ from the cooling of a dead body exposed to the same temperature.[1] Tremor probably occurs only when

the methods of diminishing heat dissipation are not equal to checking the loss.

Similarly, excessive heat production is met by an increased activity of the various systems connected in heat loss. A direct action on heat production takes the form of disinclination for exercise when the temperature rises to any marked degree.

The factors which are concerned in the production of the normal temperature swing are the activity and rest of the muscular, glandular, and nervous systems. Variations of activity, and consequent liberation of heat, are met by variations in the activity of the vasomotor and sweat centres. The resulting balance manifests itself in the form of a variation of the body temperature. The factors concerned in heat production can be brought under experimental control without injuring the balance. Vasomotor constriction and dilatation, sweat secretion and evaporation from the skin and mucous membranes, are not capable of control or modification without interference with physiological function.

The writer, in conjunction with Dr. Sutherland Simpson, undertook a series of observations* on the monkey, with the object of observing what effect modification of the periods of rest and activity would have on the body temperature of that animal.[2]

The more perfect the balance is between heat production and heat loss, the more level will the temperature be. We had noted that the daily temperature variation of the monkey amounted to several degrees Centigrade, corresponding closely in form with that of the tuberculous human subject. With such a large daily variation, it was reasonable to suppose that control was relatively imperfect, and that variations could be more easily produced and noted. This expectation was borne out by the results obtained. We found that by reversing the routine of the monkeys' life—by making them sleep during the day in a darkened room, and lighting the room by artificial light at night—we were able to produce a reversal of the normal swing. We found, further, that in the owl, whose period of activity corresponds naturally with the night, the swing is inverted.[3]

In man the normal daily variation is relatively very small,

* In the Physiological Laboratory, University of Edinburgh.

being variously estimated at from 1° to 3° Fahr. It has been found difficult to induce inversion of the swing; the result of reversal of the periods being a disturbance of the normal variation, but it is denied that complete reversal can be brought about.[4]

This of itself is evidence of the diminished control in the monkey, as we found that inversion took place almost immediately. On examining our monkeys, eight in number, post-mortem, we found that one was tuberculous. The disease was widespread, probably abdominal in origin, but affecting the lungs by direct spread through the diaphragm, and accompanied by softening. Its temperature throughout the experiment differed from normal individuals of the same species, and its reaction to the conditions throws further light on the question of the causation of the temperature perturbation in tuberculosis.

We found that the tuberculous monkey was even more sensitive to change than the normal monkeys, and that it responded to change more quickly than the others.[5]

Chart I.

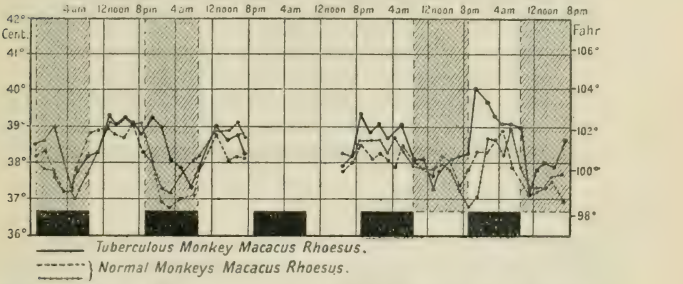

Chart I. *shows the temperature (two-hourly throughout the 24 hours) of three Macacus Rhoesus monkeys. The temperature is recorded in degrees Centigrade. The corresponding figures in Fahrenheit are given at the right-hand margin. The black band at the foot indicates night; the shaded band, the monkeys' resting periods; reversal of conditions in the centre of the chart.*

Note the inversion of the temperature swing.

It will be noticed, on reference to the chart, that the inverted swing is established in the tuberculous monkey a day earlier than in the others.

The mean temperature of the tuberculous monkey was at first normal, and differed only from the others in possessing an increased swing. The exaggeration of the swing took place in both directions, though more distinctly in the upward direction. Later on, it developed a distinct rise in the mean which is discussed below.

Other modifications of the periods of rest and activity produced identical results, the tuberculous monkey reacting relatively more quickly than any of the others.

We found that the natural alternation of darkness and light simply acted as signals for rest and activity. The monkeys were kept in the dark for seven days. At the commencement of the period the swing was quite distinct. By the end, however, it had practically disappeared. It lost its regular diurnal character, and the curve merely showed irregular waves. These were caused by the fact that the monkeys were allowed to move about when they liked, and did so irrespective of any regular natural period.

Chart II.

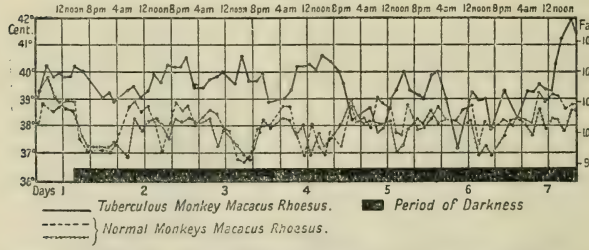

Chart II. *shows the gradual disappearance of the natural rhythm. It will be noticed, on referring to the chart, that the curve of the tuberculous monkey immediately loses its diurnal rhythm long before any of the others. The curves, degrees, &c., are represented as in Chart I.*

The result of the experiment so far was to show that in an animal with a naturally high diurnal wave control is deficient. It showed that in a tuberculous animal of the same species control is still further deficient, which agrees with what is known clinically of the temperature control in human tuberculosis.

We then proceeded to investigate the effect of alimentation

on temperature. This part of the experiment was carried out by Dr. Simpson alone. The animals were deprived of solid food for 72 hours, water only being allowed. The conditions as to rest and activity were normal. During the period of starvation the monkeys were all as active as when fed, if not more so. No effect was produced on the swing. The mean temperature continued normal till the end of 26 hours. In the normal monkeys it fell about a degree. In the tuberculous monkey, whose temperature was at this time fully a degree higher than the normal, the fall was much more marked. It fell more than two degrees, or to exactly the level assumed by the normal monkeys.

Chart III.

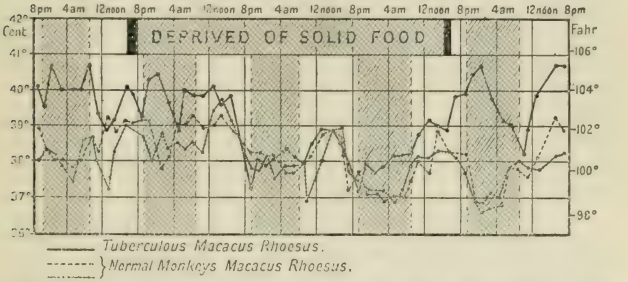

Chart III. *shows the effect of starvation on the mean temperature. Note that the temperature of the tuberculous monkey becomes indistinguishable from the normal. Curves, &c., as in Charts I. and II. Shaded bands indicate night.*

The rise towards the end of the 72 hours was brought about by excitement, owing to the monkeys' food being brought into the room and locked in a cupboard before the end of the 72 hours. It affected several of the monkeys, but the tuberculous one more than any.

The fact that the temperature of all the monkeys falls simultaneously shows that the fall must be due to the same cause. It is not likely that any change in the diseased conditions could account for a fall so identical in character, occurring both in the normal and tuberculous. At the close of the period, after the food was taken, the temperature resumed its former high level.

This shows that gastro-intestinal metabolism, both physiological (digestion), and pathological (fermentation), has a very distinct influence in sustaining a raised mean in tuberculosis. The fall takes place when the intestine is empty, after 26 hours of starvation, and not merely at the close of ordinary digestion, so that in all probability the raised mean of the tuberculous monkey was due to toxic absorption from intestinal fermentation. Hardly less remarkable than the fall, is the exact similarity of the tuberculous and normal curves, until a new disturbing agent is introduced. The possible significance of this will be discussed later.

The excessive action of gastro-intestinal metabolism on the temperature in tuberculosis is quite in accord with clinical experience, although the above observations would tend to emphasise still further its importance. Gastro-intestinal disturbance, which in the normal individual would cause no temperature disturbance, in the tuberculous causes a marked elevation of temperature, lasting until the cause is removed. From the above observations, it would seem that activity and rest are the causes of the diurnal variation, both in tuberculosis and in health.

We took for granted that the mechanism of heat dissipation was reacting normally in the normal monkeys, and modified the curve solely by acting on the mechanism of heat production. In the tuberculous human subject, and in the tuberculous monkey, this is not the case. There exists a deficiency of control from poisoning of the heat centres. The flushings and sweatings of the tuberculous patient are the response of the heat-regulating mechanism taking place suddenly and spasmodically, only when the body temperature is much above the point at which their normal gradual action should have begun.

Sweating is said to occur apart from extreme temperature elevation. In such cases the temperature, by the time sweating is established, is on the downgrade. In addition, rise of temperature may be sudden and exceedingly transient, and may be missed entirely by the ordinary intermittent method of recording. Another indication that the temperature is caused by want of control, is the relatively slight effect which a swinging temperature may have on the patients' strength,

indicating that it was due, not so much to any sudden increase in combustion, as to accumulation of heat from deficient dissipation. This does not apply to all types of tuberculous temperature, as will be seen later.

There are many unsolved difficulties to be met with in the consideration of the action of the toxins.

The first question that arises is:—Does tubercle toxin of itself produce temperature disturbance? It is asserted, on the one hand, that injection of tuberculin causes a rise of temperature: on the other hand, it is said that such rise only takes place as the result of local changes at the seat of the lesion. In other words, that tuberculin itself has no action on temperature, but has the power of setting up changes which have. These changes may be due in part to other organisms at the seat of the lesion, which further complicates the problem.

It further introduces the question as to the significance of the febrile reaction following the injection of any toxin, as to how much is due to poisoning of the heat centres, and how much due to the metabolism concerned in the formation of anti-bodies. Both take part, but the second has, I believe, not yet received due consideration.

It is a well-known fact that (especially in tuberculosis) injection of toxin causes a fall in resistance, as measured by the agglutinins and opsonins, out of all proportion to the dose injected. It might, therefore, be argued that the temperature was due to local changes, induced by the sudden fall in resistance. On the other hand, the injection of large doses into normal individuals is followed by a similar temperature reaction, when there is presumably no local lesion. It must be remembered, however, that such large doses cause other symptoms: dyspnœa, cough, &c., which may be associated with local congestion of mucous membranes, sufficient, again, to introduce the possibility of outside organisms participating in the process.

Maragliano[6] has shown that injection of a filtered tubercle culture causes a fall in temperature, while the same culture, heated to 100° Centigrade, previous to injection, causes a rise. He argues that an unstable body is present in excess, which causes the fall; that it is destroyed by heat, and allows the

action of another antagonistic body to take place. It does not follow, however, that the same bodies are formed in the tubercle nodule, or are present in the same proportion.

Surgical tuberculosis is Apyrexic and is certainly the purest type, hectic swing being set up by varied infection, after surgical interference with the disease.

Miliary tuberculosis of the lung is probably the purest form of pulmonary tuberculosis besides being the most toxic and rapid. Apyrexic cases are fairly common, but this peculiarity does not alter the course of the disease. On the other hand, it has been shown that, even in the miliary tuberculosis, other organisms may be distributed along with the tubercle bacillus.[7]

It can, at least, be said with certainty that temperature perturbation is rarely, if ever, a feature of pure tuberculosis.

The development of a swinging temperature, or a rise in the mean, is probably invariably a sign of disturbance other than tuberculous. The special feature of the condition being deficient control, though how much of this is due to the tubercle toxin, it is difficult to estimate.

From the experiment on alimentation described above, it would seem as if the poisoning of the centres by the tubercle toxin permitted intestinal organisms and fermentative products to take the place of the mixed infection found in the local lesion. In all probability the tubercle toxin produces a condition of the heat centres, which makes the development of a hectic swing possible, or, at least, more perfect.

The swinging temperature is frequently seen to take the form of waves, the evening record rising for several days and then falling. This remission and exacerbation of the condition may be the result of the periodic variations in the quantity of antibodies which have recently been demonstrated to occur.

It will be noted, on referring to the charts of the monkeys' temperature, that, when once the rise in the mean was established, there occurred a diminution in the swing, the condition resolving itself into one in which the morning remission fails to occur. Here the condition is due to intestinal changes, and the absence of the morning remission to intestinal fermentation. Corresponding to this, there is found a well-marked type in man. This type is characterised by a

raised mean about 99° Fahrenheit with a diminished swing, the morning record rarely reaching the normal. There is usually widespread crepitation with little consolidation and little sputum. It is invariably associated with marked gastro-intestinal symptoms, fermentation, flatulence, and constipation or diarrhœa. From the point of view of prognosis, this indicates a bad type of disease. Whether it is accompanied by actual tubercular disease of the gastro-intestinal tract, I have not been able to verify, but it closely resembles the type of temperature found in Avian tuberculosis. Fowl tuberculosis is almost invariably intestinal, with diarrhœa.

Chart IV.

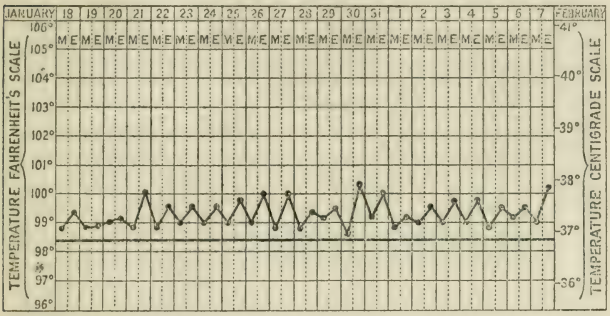

Chart IV. *shows a temperature of the gastro-intestinal type.*

Chart V.

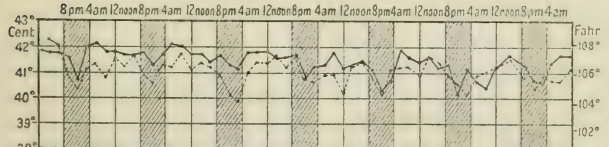

Chart V. *shows the temperature of a normal fowl (dotted line) along with that of a tuberculous fowl.*

The deficiency of control may be exaggerated in cases with pre-existent nerve instability, causing the so-called

hypohyperpyrexia, which is simply an exaggeration of the normal increased swing, the spasmodic action of the heat centres causing an exaggeration of the fall.

It must be noted that the ordinary sanatorium four-hourly, or daily, chart records the maximum of the wave, which generally occurs from 4 to 8 p.m., but misses the minimum, which is usually past by 6 a.m. This exaggerates the upward swing as compared with the downward.

Chart VI.

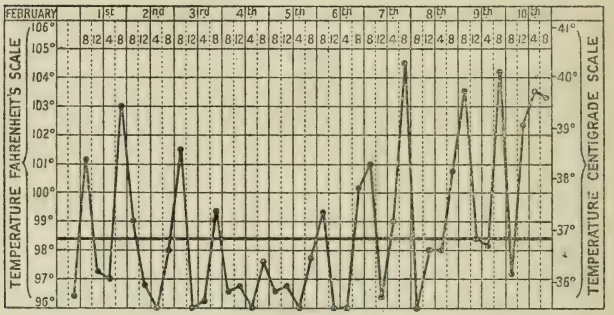

Chart VI. *shows a case of Hypohyperpyrexia in a lunatic.*

Frequently there is seen an inverted swing, which may be due to raising of the morning temperature by intestinal toxæmia. An occasional inversion is frequently found in the gastro-intestinal type. When the temperature is subnormal, inversion does not appear to adversely affect the prognosis.

Another cause of elevation of the mean temperature is septic poisoning, accompanying increased activity in, or disintegration of, a focus. This tends to be higher than the gastro-intestinal, and the swing is generally greater and more irregular. The physical signs are those characteristic of breaking down, and differ markedly from the former.

In this type, there may be some relationship between the excretion of albumose in the urine, and the mean height. It is difficult to estimate small traces of albumose, except by the rough indication got by the intensity of the reaction. It is present in minute quantities in all cases of cavity formation.

The reaction, which I have employed, is Salkowski's

(precipitation with phosphotungstic acid, solution of precipitate in caustic potash. The addition of a few drops of copper sulphate produces a biuret reaction, varying in intensity with the amount of albumose present). The results, which I have obtained, would appear to show that lowering of the mean temperature is accompanied, in this type of case, by a diminution in the quantity of albumose.* Septic processes at the seat of the lesion are probably the source of the albumose. In cases with subnormal temperature, albumose may be present when there is extensive disease, but no relation appears to exist between the quantity present and the temperature.

Chart VII.

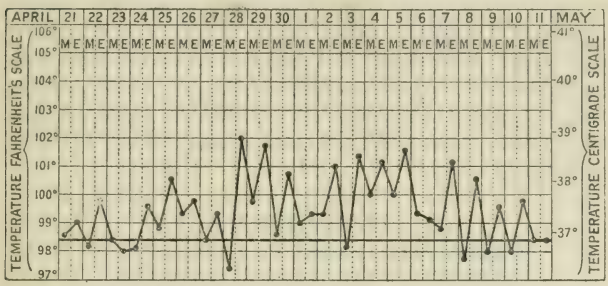
APRIL
21 22 23 24 25 26 27 28 29 30
1 2 3 4 5 6 7 8 9 10 11
MAY
M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E
TEMPERATURE FAHRENHEIT'S SCALE
106° 105° 104° 103° 102° 101° 100° 99° 98° 97°
TEMPERATURE CENTIGRADE SCALE
41° 40° 39° 38° 37°

Chart VII. *shows the type of temperature associated with cavity formation and septic processes.*

it is frequently modified by co-existing intestinal irritation. Many other causes of disturbance might be similarly illustrated, such as septic-absorption from teeth, mental excitement, &c.

Clinical experience and the above researches show that temperature control in pulmonary tuberculosis is deficient from chronic toxic poisoning.

The factors concerned in the production of the temperature perturbation are mixed infection and toxic absorption from the intestinal canal, or the local lesion. The treatment of such temperatures must depend on the successful analysis of the various factors at work. The importance of gastro-intestinal change must not be forgotten, as in the less chronic

* Expenses covered by a Carnegie grant.

conditions, it lends itself to appropriate dieting and medicinal treatment. Local breaking down cannot be directly treated. The treatment of the temperature swing by antipyretics is of doubtful value, as it tends to obscure without modifying the causal condition, and only serves to make the patient more comfortable. The types with raised means do not yield to moderate doses of antipyretics, and may thus be distinguished from intercurrent influenzas and catarrhal conditions, in which the administration of antipyretics is usually followed by a fall. The hectic swing is not necessarily accompanied by increased katabolism, and may be compatible with a steady increase in weight and amelioration of symptoms.

I have to thank Professor Schäfer for the interest he has taken in that part of the work done in the Physiological Laboratory, Dr. Philip for permission to reproduce Chart VII. taken from a case in the Royal Victoria Hospital, and Dr. Mears, Woodburn Sanatorium, Edinburgh, for permission to reproduce the remaining clinical charts, which are from patients who were under my care when Resident Physician at Woodburn.

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STERILISATION OF THE HANDS.

By R. ATKINSON STONEY, M.B., B.Ch., B.A.O. (Trin. Coll Dub.);
Visiting Surgeon to the Royal City of Dublin Hospital.

About this time last year I was led to start some experiments on sterilisation of the hands, in order to prove the necessity, or otherwise, of wearing gloves while operating. Although many operators, who have accustomed themselves to the use of gloves by constant and prolonged practice, state that they can work quite as well with gloves as without, still it will be admitted by everybody that, if the hands can be made sterile before operation by a short and simple process, and remain so during the operation, however long it may last, there is no need for the wearing of gloves in ordinary aseptic operations. On this subject Kocher says, "No one can deny that these (rubber) gloves have their disadvantages."

The object of my experiments was to determine if it was possible to make the hands absolutely sterile, and, if not, whether the organisms remaining were pathogenic or not. It is, of course, generally accepted that the superficial layers of the skin can be sterilised, but that is not sufficient, as during the progress of a long operation the surface layers of the epidermis are rubbed off and the deeper layers exposed. The question is, therefore, can the deeper layers be sterilised? If not, what organisms remain? With most experimenters, the fact of any growth occurring in their culture media has been considered sufficient to prove that the method of sterilisation was inefficient; but I considered that it was quite possible that any organisms, remaining in the deeper layers of the skin, might be of a non-pathogenic variety, and might therefore be considered harmless, so that a method of sterilisation, which, theoretically, was not efficient, might yet practically be all that could be required; in fact, the presence of non-pathogenic bacteria does not necessarily imply the presence of bacteria which are pathogenic. One point I particularly desired to find out, namely, the danger of infecting sterile silk ligatures, while tying them. This has been considered by many people

one of the most probable methods of infecting wounds, if gloves are not worn, so much so that some operators recommend that the tying of all ligatures should be left till the end of an operation, and that gloves should be worn at least while this is being done.

The methods employed by various experimenters in order to test the sterility of the hands are almost innumerable, and differ widely in their stringency. One extreme is the removal of a piece of skin and the placing of it in the culture medium, and the other extreme the mere stroking of the dry hand with a fine platinum wire, or a swab of cotton wool. It is probably largely owing to the difference of procedure adopted that the great divergence of results has been obtained by different workers in this field.

To my mind, the stringency of the test cannot be too great, as in many operations where the finger is freely used in dissecting or separating adhesions, and especially in operations on bones, considerable force has to be used, and the superficial layers of skin are very liable to be rubbed off. I therefore made all my tests as stringent as possible. The following is the method adopted :—

Eight tubes were taken, four of broth, and four of agar-agar. These were divided into two sets, marked A and B, each consisting of two tubes of broth, marked 1 and 2, and two of agar, marked 3 and 4. In the first place, a small piece of skin was snipped off the palmar surface of the tip of one of my fingers and placed in the tube labelled A1. In the second place, a piece of sterilised silk, about 2½ inches long, was taken, and on this a knot was tied, twisting the ends round my fingers, and using sufficient force to cause the silk to press deeply into the skin of the fingers (considerably more force was used than would be employed in tying any ligature in the course of an operation). This was then placed in the tube marked A2.

A blunt-pointed instrument (probe or director) was then taken and scraped along the dorsum and palm of the hand and fingers. With this the agar tube A 3 was smeared. After sterilisation in the flame, the same instrument was used to scrape under the nails of one hand, and with this the tube A 4 was smeared. The tubes marked A were inoculated in this way after sterilisation of my hands, and the tubes marked B

were inoculated in exactly the same manner, after I had been operating for periods varying from half an hour to two hours, without any further efforts at sterilisation beyond an occasional rinsing of the hands in a basin of sterilised water.

The following was the method of sterilising the hands :— (1) Scrubbing with a sterilised nail-brush in hot water (as hot as could be borne) with carbolic soap for five minutes, several changes of water being used ; (2) rubbing thoroughly with sterile gauze wet with methylated spirit ; (3) immersion for one minute in a watery solution of biniodide of mercury (1-500). The whole process did not occupy more than ten minutes.

In every case hands, instruments, silk, &c., were rinsed in sterile water in order to remove any excess of antiseptic, which might, by its presence, interfere with the growth of organisms in the culture tubes. In all cases the hands were tested while wet, and sufficient force was used both with the silk ligatures and scraper to remove a visible amount of epithelial débris, which was transferred to the culture medium.

After the first few experiments, I found that the number of infections obtained with the silk were so numerous, and out of all proportion to the rest, that I began to be doubtful if the silk was properly sterilised. I therefore tested it, and found that it was not sterile, probably owing to the fact that it was wound too tightly and thickly on reels, and was then boiled for an insufficient length of time. A new method of sterilising the silk was then introduced, and since then a piece of untouched silk has always been rinsed in sterile water, and placed as a control in a tube of broth. In both the first and second series of experiments, this silk has only once given rise to a growth, and then it was a sporing bacillus, the infection having probably occurred through the air or through the water in which it was rinsed.

Omitting the tubes of silk infected in the experiments where there was no control made, there were 81 tubes tested, and of these nine were found to be infected—one with staphylococcus aureus, five with staphylococcus albus alone, and three with staphylococcus albus and bacilli. There was no case of infection from the skin snips of the fingers taken after sterilisation and before operation. In the case of the

TABLE SHOWING RESULTS OF FIRST SERIES OF EXPERIMENTS.

No. of Experiment.		1.	2.	3	4.	5.	6.	7.	8.	9.	10.	11.
A	1	Sterile.	Sterile.	Sterile.	Sterile.	Sterile.	Sterile.	Sterile.	Sterile.	Sterile.	Sterile.	Sterile.
	2	,,	,,	×	×	×	,,	Staphylo-coccus albus.	,,	,,	,,	,,
	3	,,	,,	Sterile.	Sterile.	Sterile.	,,	Sterile.	,,	,,	,,	,,
	4	,,	,,	Staphylo-coccus albus.	,,	,,	,,	,,	,,	,,	Staphylo-coccus aureus.	,,
B	1	,,	,,	Bacilli Staphylo-coccus albus.	Bacilli Staphylo-coccus albus.	,,	Staphylo-coccus albus.	,,	,,	,,	Sterile.	,,
	2	×	,,	×	×	×	Sterile.	,,	Staphylo-coccus albus.	,,	,,	Staphylo-coccus albus and bacilli.
	3	Sterile.	,,	Sterile.	Sterile.	Sterile.	,,	,,	Sterile.	,,	,,	Sterile.
	4	,,	,,	,,	Staphylo-coccus albus.	,,	,,	,,	,,	,,	,,	,,
		No control experiments with silk.					Control experiments with silk.					

The results marked with a cross are those in which the silk tubes were infected before I started the control experiments.

skin snips taken after operation, there were three infections; two of these occurred before the silk was tested, and on each of these occasions the silk tubes were also infected, so that it is quite possible that the skin may have been infected while tying the silk. In the other case the infection might have occurred from the patient's skin, or from the air. That it was not a true infection of the deeper layers of the skin is supported by the fact that on the same days a similar piece of skin taken before operating gave no growth. In the case of this test, as the whole depth of the false skin is taken, there is no reason why the incidence of infection should vary according to whether the specimen is taken before or after operation, unless infection occurs during the operation, or unless more antiseptic is introduced with the first specimen put into the culture medium than with the second. As will be seen later, there is good reason to believe that the latter is not the case. It may be objected that this is not a fair test, since the organisms may be present in the portion of skin removed, but may be unable to get out into the culture medium and grow in it. This, however, I think, is not the case, for when the tubes were examined at the end of a week, in all cases the portion of skin had become so macerated that, on shaking the tube, the greater part of it broke up into fine particles, and in many cases the whole piece of skin disappeared, and was merely represented by a fine deposit at the bottom of the tube. In the case of the silk ligatures, three infections occurred, though on all these occasions the skin snips were sterile. This may be due to the fact that the infection was obtained from the lateral aspects of the fingers, which are less exposed to the cleansing processes than the palmar. Still I am more inclined to think that these were accidental infections, as in a further series of experiments which I undertook with this object in view, using the same method of sterilisation, there was no infection in 14 consecutive experiments.

In the case of A_3 and B_3, scrapings from the fingers and hands, there was no infection in the 22 experiments. In the case of A_4 and B_4, scrapings from under the nails, there were three infections, twice with staphylococcus albus and once with staphylococcus aureus. In the latter case the

infection was undoubtedly due to my own carelessness, for I found a small particle of what I may call "social dirt" under one of my nails, which was longer than it should have been.

We see, therefore, that staphylococcus aureus, which is certainly dangerous, and capable of producing suppuration, only occurred once, and then admittedly as the result of carelessness. The bacilli which occurred three times may be dismissed as being non-pathogenic, and therefore harmless. We are left then with eight cases of infection with staphylococcus albus. I shall not go into the disputed question of the pathogenicity, or otherwise, of this organism, beyond saying that I believe that, under favourable conditions, as the presence of blood-clot or dead tissue, it can produce suppuration.

I must confess that I was disappointed in the results of this series of experiments, and was forced to come to the conclusion that I had not yet found a trustworthy method of sterilising my hands. For although, from the above table, the incidence of infection appeared greater than it really was, there was no doubt that, although sometimes complete sterility of the hands was obtained by this method, still there was always a chance of the continued presence of staphylococcus albus on the hands, and therefore a chance of infecting clean wounds unless gloves were worn.

About this time, I read a paper by Dr. Harrington,[1] in which he recommended a new fluid for sterilising the hands. The formula that he gave was as follows :—

Alcohol 94 per cent. - - -	940 c.c.
Hydrochloric acid (strong) - -	60 „
Water - - - - -	300 „
Corrosive sublimate - - -	0·8 grm.

As the result of numerous experiments, Dr. Harrington claimed for this fluid great antiseptic power. I therefore started a new series of experiments, using this fluid in the preparation of my hands, which was as follows :—(1) Washing for five minutes with nail-brush and carbolic soap in several changes of water, as hot as it could be borne. (2) Soaking

[1] "Some Studies in Asepsis," Charles Harrington, M.D., *Annals of Surgery*, October, 1904.

my hands for three minutes in a fluid of the following composition :—

Commercial alcohol (90 per cent.) -	℥ xxvi ss.
Hydrochloric acid (commercial) -	℥ ii ss.
Water - - - - -	℥ xi.
Corrosive sublimate - - -	gr. xvi.

I took two tubes of broth and four of glucose agar. These I divided into two sets, labelled D and E, each consisting of one tube of broth and two of glucose agar, one of which was sloped. These were marked 1, 2, and 3. In 1, a piece of silk was placed, on which a knot had been tightly tied. In 2, a stab was made with a probe, with which the back and front of one hand and fingers had been vigorously scraped. In 3, a smear was made with a probe, which had been scraped under the nails of one hand. The tubes marked D were inoculated immediately after sterilisation, and the tubes E after operating for a variable length of time. The same precautions were taken with regard to stringency and prevention of any excess of antiseptics as in the first series of experiments. The following is a table giving the results (*see* p. 164) :—

In these experiments there was no case of infection with any of the staphylococci ; the only four cases of infection which occurred were of a sporing bacillus, and one of these infections, that occurring in experiment 20, was on the occasion (alluded to above) on which the control silk tube also showed an infection with a similar bacillus. The number of infections then may be taken as three out of one hundred and twenty tubes. This bacillus is undoubtedly a non-pathogenic organism, and it is therefore immaterial where it came from, whether from the hands, or the air, or the water in which hands, instruments, and silk were rinsed. I say immaterial, because, being non-pathogenic, it does not in any way endanger the patient by its presence, and therefore its occasional appearance is no evidence of the necessity for using gloves. As I have said above, I do not hold with those observers who consider that the presence of any form of micro-organism shows the possible presence of others, as it is quite natural to suppose that all the pathogenic bacteria may be completely killed, or removed, by any given method of cleaning the hands, whereas non-pathogenic

TABLE SHOWING RESULTS OF SECOND SERIES OF EXPERIMENTS.

No. of Experiment.		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
D - - -	1	Sterile.	Sterile.	Sterile.	Sterile.	Sterile.	Sterile.	Sterile.	Sterile.	Sterile.	Sterile.
	2	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	3	,,	Sporing bacillus.	,,	,,	,,	,,	,,	,,	,,	Sporing bacillus.
E - - -	1	,,	Sterile.	,,	,,	,,	,,	,,	,,	,,	Sterile.
	2	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	3	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,

(*Continued.*)

No. of Experiment.		11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
D - -	1	Sterile.	Sterile.	Sterile.	Sterile.	Sterile.	Sterile.	Sterile.	Sterile.	Sterile.	Sporing* bacillus.
	2	,,	,,	,,	,,	,,	,,	,,	,,	,,	Sterile.
	3	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
E - - -	1	,,	Sporing bacillus.	,,	,,	,,	,,	,,	,,	,,	,,
	2	,,	Sterile.	,,	,,	,,	,,	,,	,,	,,	,,
	3	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,

* In this case the control silk tube also grew a sporing bacillus.

organisms, especially if they are spore-bearing, may not be invariably destroyed by the same process.

It might be thought that the antiseptic fluid would be unpleasantly strong and harmful to the hands; I found, however, that, though I used it several times a week for many months, it caused no inconvenience. At first it caused a slight exfoliation of the skin of the palms of the hands, but it did not lead to any cracking or roughening of the skin. This experience of mine entirely agrees with that of Dr. Harrington. The great advantage of this fluid in antiseptic properties appears to be due to the combination of the hydrochloric acid with the corrosive sublimate; this view is supported by an incident which occurred during the course of these experiments. When sterilising my hands one day with this fluid, I noticed that it did not appear to be so strong as usual, there being none of the usual slight smarting of the arms; however, I made the tests in the usual manner. On inquiry I found that the fluid had been made up with the dilute hydrochloric acid of the B.P. instead of the strong commercial acid. Of the tubes inoculated on this day, two grew staphylococcus albus. Except for the omission of this experiment, the results given in the above table are from a series of consecutive experiments extending over a period of nearly five months.

Of course, in all experiments to test the efficacy of any antiseptic for sterilising the hands, the possibility of the entrance of minute quantities of the antiseptic into the culture medium must be remembered, as, although the quantity may be very small, it may inhibit the growth of any organisms introduced at the same time. The prevention of this is a matter of the greatest difficulty, as there is no easy and satisfactory method of neutralising the antiseptic used; this is true in the case of corrosive sublimate; the mere rinsing in sterilised water being a very slow and uncertain process. The method, suggested by Leedham-Green, of soaking the hands in a sterilised solution of ammonium sulphide has the great disadvantage of turning the hands black, which colour they retain until the stained layers of the skin are worn away. I did not, therefore, attempt this method. Instead I took great pains to carefully soak and rinse my hands, and everything that came in contact with the culture media, in sterilised water. The incidence of infection,

as is seen in the above table, is also opposed to the idea that growth was prevented by the action of antiseptics in the culture media, as more cases of growth occurred in the tubes inoculated immediately after sterilisation, when presumably there was a greater likelihood of some antiseptic remaining on my hands, than in those inoculated after operation, and therefore after a considerable time had elapsed since the sterilisation, no antiseptic being used on the hands in the meantime. The following fact also helps to establish this point. On different occasions I took the tubes of broth, in which no growth had occurred after being incubated for a week or a fortnight, and, having taken out the piece of silk, tied a fresh knot on it with unwashed hands and replaced it, or inoculated the broth by a platinum wire with which I had scraped my unwashed hands. In every case I got a luxuriant growth within two days. This proves that either the tubes were absolutely sterile, or, if not, the organisms they contained were so reduced in power that they were incapable of growth in a fluid which provided an excellent medium for the growth of ordinary organisms. The former of these suppositions is, I think, the more likely.

In these experiments, all the tubes were left in the incubator for at least eight days and in many cases for three weeks, but in no case did any growth appear later than the fourth day.

Most of these experiments were made on days on which I was operating on aseptic cases only, but, on some of the occasions, the operations were of a septic nature, as cases of tubercular disease with discharging sinuses, and cases of intestinal anastomosis. On these occasions, before inoculating the second series of tubes, marked E, I resterilised my hands, not, however, spending so long in the process as in the original sterilisation, contenting myself with merely soaking my hands for two minutes in the corrosive sublimate solution and then rinsing them in sterilised water; in the tubes inoculated on these occasions no growth ever occurred. The explanation of the results obtained in these cases is, I think, simple. The hands once having been rendered sterile, any superficial contamination which afterwards occurs can be easily removed.

It is frequently stated that a man who engages in operative surgery should not have anything to do with the teaching of practical anatomy, or the demonstration of surgical operations

on the dead body, or, if he does so, he should wear gloves while handling the corpse. With the present careful methods of preserving the bodies used for demonstration purposes, this is not necessary. The experiments referred to above were spread over a period of ten months, and, during that time, I was almost daily engaged in demonstrating both anatomy and operative surgery on the dead body. The dressing of septic cases in hospital is, however, a very different matter, as here we are bound to come in contact with the very organisms from which we wish to keep our hands free ; a great deal can be done by the exercise of a little care while dressing cases, so as to prevent the hands from coming into contact with any septic material, and by using forceps for the removal of soiled dressings, &c. Where the finger has to be used for purposes of exploration, gloves should always be used.

One important point, on which I have not yet touched, is that the individual has to be taken into account in any scheme of sterilisation, both as regards the natural septicity of his skin and his tolerance of antiseptics. People vary very greatly in the ease with which their skin can be made aseptic. Those with a naturally coarse, or greasy, skin find it more difficult to sterilise their hands than others. Again, people vary greatly in the tolerance of their skin to powerful antiseptics, even weak solutions of some of the chemicals commonly used and alcohol causing their skin to become hard and cracked, or even ulcerated. For these unfortunate people, the wearing of gloves is a necessity if they determine to engage in surgical work.

The result of these experiments has confirmed my opinion that it is possible to render the hands sterile, or at least free from pathogenic bacteria, by a simple and short method. It is simple, in so far as it only consists of washing in hot water and then soaking in an antiseptic fluid, and is short, inasmuch as the whole process requires less than ten minutes. The wearing of gloves, therefore, during the performance of an aseptic operation is not necessary, though it is advisable in the case of those operators whose skin is either unusually difficult to sterilise, or easily injured by the constant use of antiseptics. I may perhaps be allowed to suggest that anyone who intends engaging in the practice of surgery would not find it a waste of time if he were to undertake a series

of experiments for himself, in order to find a method of sterilising his hands which will suit himself, and ensure good results. The demonstration of practical anatomy and operative surgery on prepared bodies does not unduly increase the difficulty of sterilising the hands, and gloves need not, therefore, be worn during these demonstrations, though it may be thought advisable for purely cosmetic purposes. Where, however, an operator comes into contact with true septic material, as in dressing cases, post-mortem work, &c., gloves are necessary, and should always be worn.

In conclusion, I would mention that the bacteriological examination of all the tubes used in these experiments has been carried out by Dr. T. G. Moorhead, my colleague in hospital, and Demonstrator in Pathology in Trinity College, to whose advice and assistance in this work I am deeply indebted.

PLATE III.

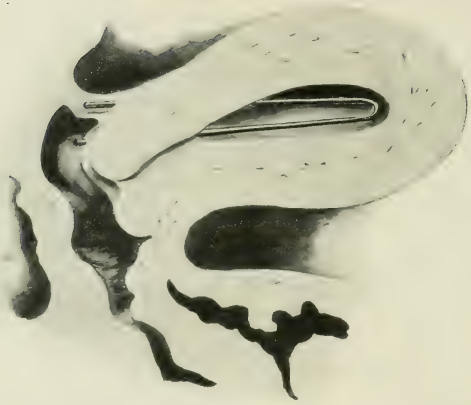

Fig. 1. *Case of Hairpin impacted in the Uterus.*

ON FOREIGN BODIES IN THE UTERUS.

By J. B. HELLIER, M.D. (Lond.),

Obstetric Physician to the Leeds Infirmary and Lecturer on Gynæcology in the University of Leeds.[1]

[With Plate III.]

Cases in which foreign bodies have been found in the uterus are not very common. In this respect the uterus contrasts with the vagina, in which an astonishing variety of extraneous objects have been met with. In medical literature up to the present time there are at least 127 examples of foreign bodies found in the womb. I propose to give an account of a case, not yet published, which has recently been under my care, and then to summarise what is known of the subject generally, for it receives very little attention in text-books.

Case.—E. K., a married woman, aged 34, residing near Leeds, was admitted into the Leeds Infirmary on June 29, 1905, at the request of her medical attendant, Dr. Steven, of Featherstone, who stated that the uterus contained a hair-pin.

The patient stated that she had borne 12 children in 16 years, and had had one miscarriage two years previously. Up to four months before admission, she menstruated regularly with a tendency to excess. At this time she found that she was passing clots at her period, and thinking, to use her own words, that "there was something to come away," she passed into the uterus a hair-pin, which entered easily, but which she could not withdraw. She denies that she had any suspicion of pregnancy. After this she had a good deal of hæmorrhage from the vagina, both at and between the periods, sometimes "losing" every day. There was pain at the hypogastrium, and also bearing down and painful defæcation.

On admission, she seemed to be a well developed, healthy woman.

On vaginal examination, one point of the hair-pin could be felt projecting from the middle of the posterior labium uteri, just above the surface of the mucous membrane. (*See* Fig. I.*)

On July 1st, the patient was anæsthetised. I then drew down the cervix with vulsellum forceps. One point of the pin

[1] A paper read at the Leeds and West Riding Medico-Chirurgical Society.

* Drawn by R. S. Nichol, M.B.

projected from the posterior lip as said above, the other could be felt under the mucous membrane at the junction of the cervix with the posterior vaginal wall. The sound, when introduced into the uterus, struck the foreign body, and passed 3½ inches, the uterus being anteverted.

Removal was accomplished by drawing down the uterus, exposing the posterior prong with a snip of the scissors, then drawing down both prongs as far as they would come, and straightening out the pin, after which it was easily withdrawn. The uterus was then curetted and carbolised. Recovery was uncomplicated. The pin was an ordinary stout hair-pin, 3¼ inches long, and very rusty.

ON FOREIGN BODIES IN UTERO.

Neugebauer, of Warsaw, in an article published in *La Revue de Gynécologie et de Chirurgie Abdominale*, 1898, gives abstracts of 76 cases[1]; Odefey, in a disseration published 1892, collects 17 more,[2] and adds two personal observations; Lewers[3] records another, and Knoop, of Kiel, has recently recorded two others.[4] There is also a good critical review by De Bovis in *La Semaine Médicale*,[5] March, 1898. The remarks which follow are founded on the articles and cases just referred to; additional references will be found in the Index Catalogue of the United States Army Department.[31]

Varieties of Objects found in the Womb.—The list of foreign bodies found in the uterus, or in the surrounding tissues after migration therefrom, is as follows:—

Hair-pins, needles, crochet-hooks, knitting-needles of wood or metal.

Pessaries, both intra-uterine stems and also vaginal pessaries that have migrated into the uterus.

Portions of gum-elastic catheters, or bougies.

Portions of sponge, wood, bone, glass rod or of broken glass, uterine tubes, or canulæ, of whalebone, of pipe-stem.

Goose-quills, laminaria, tupelo, or sponge-tents.

Portions of metallic instruments, including an Apostoli's electrode.

Leeches, tapeworms.

An ear of wheat or straw, a ring, part of a metal candlestick, a wooden bobbin, a bone ear-scoop, an indiarubber ball,

a pebble, a silver-wire suture from a previous Cæsarian section, a tin box, a peruke, and a diamond.

It will be seen that some of the above are, in their nature, such as are likely to be retained. Hair-pins, for instance, tend to advance towards the head, whilst the diverging and pointed prongs resist retrograde movement. Of the 99 cases recorded, no less than 22 were hair-pins. The peruke referred to[6] was removed from the uterus and vagina of a woman employed in the green-room of a circus, and was such as the clown wore.

These foreign bodies may be classified according to the *reason for introduction* :—

1. About half the total number were probably, or certainly, introduced to procure abortion.

2. Next numerous are those inserted in connection with therapeutic measures. For instance, leeches applied to the cervix have migrated into the uterine cavity. I myself have known this to happen. Stem-pessaries, tents, pieces of gauze and wool are other examples. The migration of vaginal pessaries, to be discussed directly, comes under this heading; in some instances, the patient herself has inserted the foreign body into the vagina, or uterus, with honest intent, and with the idea of removing some supposed obstruction, or of curing some discharge.

3. In some few cases self-abuse has been the motive confessed.

4. Attempts to prevent conception explain other cases, examples of which are seen in the use of an intra-uterine stem, of a ball of crumpled paper, and probably in the insertion of the peruke already referred to.

5. The vagaries of hysterical, or insane, patients explain others. One hysterical patient introduced a pebble, another a rabbit's bone.[7] In the case of a lunatic, a portion of a metal candlestick was found.[8]

6. Accident accounts for some. A pipe-stem has been known to pass from bladder to uterus,[9] and a needle from an abdominal sinus into the uterus,[10] while, in another case, a knitting-needle penetrated the uterus, owing to the patient having sat on a chair, on which was a ball of worsted, from which the needle was projecting.

7. Certain authors have mentioned worms as being sometimes found in the uterus, but I have not been able to meet with any well observed instance hitherto recorded. The following case has been communicated to me by my friend, Mr. H. de P. Veale, of Drighlington. A patient, aged 54 years, multiparous, obese, applied for treatment on account of foul discharge, sometimes blood-stained, which had been of long duration. On vaginal examination, the uterus was found to be bulky, and the os patent, but no new growth could be made out. The discharge was most offensive, and antiseptic douches failed to relieve it. Ultimately the case was sent to the late Mr. Jessop, of Leeds, and he removed from the uterine cavity a large tænia solium, after which the patient made a good recovery.

8. Mr. Veale has also communicated to me a case, which suggests another motive for the introduction of foreign bodies. A female South African native, employed by De Beers before the Rhodes amalgamation, died under suspicious circumstances. On post-mortem examination, a diamond of considerable value was found in the uterus. The use of the vagina as a receptacle for stolen, or smuggled, articles is not unknown in our own country, and doubtless this case is to be explained in this way.

MIGRATION OF VAGINAL PESSARIES INTO THE UTERUS.

The instances in which vaginal pessaries have entered the uterus have occurred for the most part in aged women, and it is surprising that the senile uterus should be capable of the requisite distension. Thus a case is recorded by Herzfeld,[12] where a Breisky's egg-shaped pessary was removed from the uterus of a woman of 77. She had worn it for five years, but up to five months before had removed it regularly herself. Then it became impacted, and was found within the uterus with the cervix contracted behind it. It measured 6 centimetres in the smaller diameter. We reproduce the rough sketch which Herzfeld gives. (*See* Fig. 2.) After incision and dilation of the cervix the vulcanite pessary was perforated with

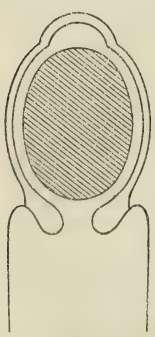

Fig. 2.

the thermo-cautery, and removed by morcellement. Heiman[13] removed from the dilated cervical canal of a woman of 70 a Hodge's pessary, which had slipped into the uterus from the vagina, whilst she was lifting another person. The accident caused immediate severe pain in the hypogastric region. A greatly hypertrophied, elongated cervix presented at the vulva on straining, and the finger, when introduced into the cervical canal, could feel the small end of the Hodge. The pessary was withdrawn by dilating the cervix and passing a bandage through the pessary. Rust[14] tells of a pessary introduced by a midwife directly after labour, which entered the uterus, and Spancken[15] reports an instance of a vaginal pessary introduced for prolapse six weeks after labour, which six weeks later was found incarcerated in the womb, although the pessary was 5 cm. broad. Biggs[16] reports a case in which a Maw's cup-shaped pessary with external supports was placed in the vagina of an old woman, and a fortnight later was found incarcerated in the uterus, with the cervix contracted round the stem and over the cup. And, lastly, Bradfield[17] narrates a very singular case where a glass vaginal pessary was retained for 25 years. The pessary was $4\frac{3}{8}$ inches long, and consisted of a stem terminating at one end in a kind of flattened bulb, $2\frac{1}{8}$ inches in diameter, and, at the other, in a flat button, $1\frac{1}{4}$ inch in diameter, and $\frac{1}{12}$ thick. This seems to have been introduced originally upside down, and the button, stem, and most of the bulb had penetrated into the uterus for a total distance of $4\frac{1}{4}$ inches. In all this long period of years, the patient had a singular absence of symptoms, and seems to have been unaware of the presence of the pessary, until a sudden attack of leucorrhœa led her to seek treatment.

The existence of such cases seems to depend on the presence in the vagina of a pessary of more or less elongated, conical, or ovoid shape, which is fixed or impacted below; add to this a patulous state of the cervix and long continued pressure, aided perhaps by sudden strain on one or more occasions. But this migration has also happened when a pessary has been inserted in younger women soon after confinement on account of prolapse. In such circumstances, the cervix is readily dilatable. (Under similar conditions a wooden cotton reel, placed in the vagina, has passed into the womb.[18])

SYMPTOMS AND COURSE.

The foreign body lodged in the womb is likely to become oxydised if of metal, or soft and rotten if of other material. Calcareous concretions are very apt to form upon it.

The body may be retained in the womb for months or years, or may be spontaneously expelled. This is not common, or perhaps it would be more correct to say that cases, where spontaneous expulsion does not occur, are those most likely to come before our notice. The foreign body may migrate to some other part, especially if pointed or sharp, and so it may reach the peritoneal cavity, the cellular tissue, the bladder or rectum, &c. The following are examples of such migration :—

Bandl [19] removed from the parametrium a piece of steel sound, 3·75 cm. long, which had broken off six years before, when a medical man was attempting to dilate an occluded cervix. The patient had suffered for four years from pelvic pain, painful locomotion, bladder symptoms, and pyrexial attacks. Freund [20] removed a portion of a hair-pin which was encysted in the peritoneal cavity; but this may possibly have passed through the vaginal wall. Kemperdieck [21] performed laparotomy for the removal of a goose-quill, which had been introduced into the uterus in order to procure abortion, but which, passing into the peritoneal cavity, had set up purulent peritonitis, which proved fatal. Liebman [22] extracted by posterior colpotomy part of a broken needle, which lay partly in the ovary and partly in the posterior uterine wall. Rochet [23] performed vaginal hysterectomy for fixed retroversion and double pyo-salpinx, and found in the pouch of Douglas, a caoutchouc sound with an ivory mount, which had been introduced by a midwife to procure miscarriage. Rullier [24] saw a seton-needle escape spontaneously from an abscess near the anus, 76 days after introduction into the pregnant womb. Foltz [25] removed from an umbilical abscess a catheter, which a patient had introduced into the pregnant uterus in order to procure abortion; and Crawford [26] found a pencil free in the peritoneal cavity.

The symptoms complained of must obviously vary with the condition present. They have been in some cases inconspicuous or absent for a surprisingly long time, as in a case

reported by Leegert,[27] where a pessary was retained in the uterus for 40 years without inconvenience, or that by Bradfield, already mentioned, where the pessary was 25 years in utero. Usually the patient complains of menorrhagia and metrorrhagia, pelvic pain, bearing down, vasical irritability, leucorrhœa, &c., symptoms which are common to endometritis, subinvolution, and other pelvic ailments. The leucorrhœa is very likely to be offensive, and symptoms of septic pelvic mischief may develop. Localised peritonitis or cellulitis, with pelvic abscess, may complicate the case, especially when migration has occurred. Reflex symptoms have been described, disappearing when the foreign body has been removed.

When there is pregnancy, abortion will almost always follow the introduction of the foreign body. The uterus may tolerate it for a short time, rarely so long as a week. Pain and hæmorrhage will soon come on, and septic puerperal complications are very common. In exceptional cases three or four weeks, or even longer, may elapse before symptoms occur.

A most amazing case is recorded by Czarnecki[28] in the *Deutsche med. Wochenschrift*, No. 23, 1901, a case which seems to set all probabilities at defiance.

A girl, aged 12, alarmed at the onset of menstruation, introduced into the vagina a tin box such as school children then used for holding steel pens, her idea being to prevent further loss of blood. The box is described as being of an oval shape (*von rundlichlänglicher Gestalt*), 10 cm. in diameter and 4 cm. in height. The third dimension is not stated. After this she menstruated regularly, but all attempts to extract the box were fruitless. She subsequently used a syringe for slight leucorrhœal discharge, and could always feel the box in the vagina. There were practically no symptoms, and she never sought advice or told anyone about it. She married at 25, and her husband is said not to have found out that anything was amiss. Five months after marriage she became pregnant, but aborted at four months, being attended by neither physician nor midwife. After the abortion, she could no longer perceive the foreign body in the vagina, although she knew that it had not slipped out. There seems to be no doubt that it had entered the uterus at this time. Finally she became pregnant

again and went to term, being then a well-developed, healthy woman of 27. Dr. Czarnecki, of Gnesen, was called to her (September 9, 1900). He found the os externum dilated to somewhat less than the size of a florin, and the foreign body in question lying between the head of the fœtus and the os. He removed the tin box by first getting off and extracting the lid, and then crushing the box with a pair of bone forceps. Cicatrices in the cervix required division before the os would dilate fully. Delivery was completed with forceps. The mother and child did a great deal better than might have been expected, for the child was a well-developed, healthy male, and the patient rose from childbed well on the twelfth day. The foreign body was thus tolerated 13 years in the vagina, and 1½ in the uterus, with a singular absence of symptoms, and gestation ran a normal course in spite of the presence of the tin box in utero!

Diagnosis.—This may be extremely easy or extremely difficult, according to the position and nature of the extraneous body. If the presence of the body be unsuspected, the resulting bloodstained, purulent, offensive discharge, with pain and other pelvic symptoms, may give rise to a suspicion of malignant disease of the body. Thus, Knoop relates a case[4] of a woman, aged 57, ten years past the menopause, in whom the sudden commencement of a purulent, sanguineous, offensive discharge was supposed to be due to cancer of the fundus, but exploration found a hair-pin, rusty and brittle, which had been there for six years, and yet had caused symptoms for only two months. There was no disease of the endometrium. Lewers[3] in one case made a diagnosis by means of X-rays. The best thing to do in such cases, as in so many other obscure pelvic conditions, is to make a careful and thorough examination of the pelvis, when the patient is under anæsthetic, and placed in the "lithotomy" position on a table of convenient height and in a good light. If the body be concealed within the uterus, the sound will strike it, but dilatation of the cervix and digital examination may be necessary also.

If the body has migrated, bimanual recto-abdominal examination, aided, perhaps, by drawing the cervix down, may discover it, or diagnosis may prove impossible without major operation.

Prognosis.—This is, of course, worst in pregnancy, but in the first 100 cases recorded there were only six deaths, so that the prognosis is not so very unfavourable.

Treatment.—It is not easy to make any general observations of value as to treatment. After diagnosis, the way to extract in each case will usually be sufficiently obvious to anyone of average ingenuity. It is well to remember that the responsibility for such cases is rather serious, since so many are associated with illicit practices, while any fatal case must come before the coroner.

The practitioner will be wise to protect himself with a second opinion in doubtful and serious cases.

When migration has taken place, a major operation may be necessary, and this under very unfavourable conditions, if septic infection be already present.

To the examples of major operative measures already instanced, we may add a case by Mittemaier,[29] where fragments of broken glass canulæ were removed successfully by vaginal hysterotomy.

Before leaving the subject, a word may be said about the old practice of placing certain foreign bodies in the womb as a means of treatment. *Intra-uterine* stems, when left in the womb, are liable to cause the symptoms described above as due to foreign bodies in general. Many years ago I had an opportunity of watching gynæcological practice of the old school, and was greatly impressed with the fact that these appliances did very much more harm than good. It is true that the introduction of antiseptic precautions obviates some of the danger, but who can guarantee that the vagina and uterus will remain aseptic when containing a foreign body? The use of the intra-uterine stem tends to break down the natural asepticity of the upper part of the genital tract. The worst kinds are those with a vaginal part to which an intra-uterine stem is attached. I have not employed a stem for many years, and had the impression that they were becoming obsolete; but I find, on enquiry from one of the best known firms of instrument makers, that they have a small but steady demand for all the forms of pessary that are figured in ordinary catalogues. I do not presume to advise other specialists, but I do advise the general practitioner to have little to do with

intra-uterine stems. They belong to a not inconsiderable class of gynæcological instruments which do not deserve to be figured in text-books, and they have passed out of general use for most excellent reasons.

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[7] Decés, quoted by De Bovis, *loc. cit.*

[8] Hjerstroem: Neugebauer's series, No. XXII.

[9] Martin: Neugebauer's series, No. XXXVI. (Facts not beyond question.)

[10] Thoman: *Ibid.*, No. LXIII.

[11] Pollak: *Ibid.*, No. XLVIII.

[12] Herzfeld: *Cent. f. Gyn.*, 1893, p. 633.

[13] Heiman: *Med. Record*, New York, 1894, p. 4347.

[14] Rust: Neugebauer's series, No. LVIII.

[15] *Ibid.*, No. LIX.

[16] Biggs: *Brit. Med. Journ.*, 1886, Vol. I., p. 202.

[17] Bradfield: *American Journ. of Obstet.*, 1878; and Neugebauer's series, No. VII.

[18] Walk: Neugebauer's series, No. LXIV.

[19] Neugebauer's series, No. III.; see also *Cent. f. Gyn.*, 1889, No. 33, p. 604.

[20] Freund: Neugebauer's series, No. XV.; see also *Cent. f. Gyn.*, 1887, No. 52, p. 817.

[21] Neugebauer's series, No. XXVIII.

[22] *Ibid.*, No. XXXII.; see also *Cent. f. Gyn.*, 1897, No. 16, p. 421.

[23] Neugebauer's series, No. LIII.

[24] Rullier: *Ibid.*, No. LVII.

[25] Quoted by De Bovis, *loc. cit.*

[26] Ditto.

[27] Leegert: Neugebauer's series, No. XXX.

[28] Odefey's series, No. XII.: see also *Deutsch. med. Wochensch.*, No. 23, 1901.

[29] Mittemaier: *Cent. f. Gyn.*, 1897, No 48; Neugebauer's series, No. LXXIV.

[30] Neugebauer has also published a Monograph, entitled "Die Fremdkörper des Uterus. Zuzammenstellung v. 550 Beobachtungen aus d. Literatur u. Praxis," Berlin, 1889; but, with the exception of the series already referred to, these are not foreign bodies of *extraneous* origin, but examples of retained products of conception, &c. In the present article the term "foreign body" is strictly limited to substances introduced from outside.

[31] *Index-Catalogue of the Library of the Surgeon-General's Office, United States Army*, Vol. XV., "Uterus (Foreign Bodies in)," p. 288; *see also* Vol. X., p. 983, "Pessaries (Abuse of and Accidents from)."

THE FOOD FACTOR IN THE PAROXYSMAL NEUROSES.

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In a recent article in THE PRACTITIONER,[1] reference was made to the view that the common paroxysmal neuroses, migraine, asthma, epilepsy, &c., may all be explained by pathological variations of vasomotor action, with or without the addition of variations in cardiac action; and it was argued, in the case of the malarial paroxysmal neuroses, that the pathological vasomotor action, in each instance, depends on the pathological condition of the blood, namely, the malarial toxæmia. These considerations suggest the probability of a common humoral factor in the non-specific paroxysmal neuroses—those paroxysmal neuroses which are often spoken of as "essential" or "idiopathic."

If from a sufficient elevation, we take a comprehensive survey of the three above-named paroxysmal neuroses, we notice the temporary disappearance of much differentiating detail. Concurrently and consequently, however, certain fundamental bonds of union stand out in unaccustomed prominence. For example, we lose sight for the moment of the marked anatomical differences between migraine, asthma, and epilepsy; but we perceive the more clearly on that account that all three affections conform to certain general principles. All are apt to be preceded by a period of indifferent health, or of bodily or mental discomfort, and to be succeeded by a period of restored, or even accentuated, well-being, physical and psychical. All are apt to be infrequent in proportion to their severity, frequent in proportion to their mildness. All are interchangeable, or mutually replaceable; and all tend in a sense to be monopolistic, since no two of them—except rarely, and then in quite modified form—continue to recur concurrently in the same individual.

These common characteristics naturally led to the conception of alternate accumulation and discharge—a fundamental

[1] August, 1905.

conception, which exerted a dominant influence upon the more comprehensive, because less specialised, thought of some past generations, but whose influence upon the less comprehensive, because more highly specialised, thought of the present generation, seems waning. Nevertheless, the conception continues to call for substantiation or disproof.

Defining this conception, there seems to be a gradually increasing accumulation, which, at more or less regular intervals, attains its climax and is discharged. The near approach of the climax is manifested clinically by a perversion of healthy sensibility: the discharge by the phenomena of the paroxysm; and the consequent relief to the system, by the restoration of healthy sensibility. To fit this conception, Edward Liveing postulated what may be termed the "primarily neurosal hypothesis." According to this, in those who suffer from affections such as migraine, asthma, and epilepsy, there is "a primary, and often hereditary, vice or morbid disposition of the nervous system itself: this consists in a tendency on the part of the nervous centres to the irregular accumulation and discharge of nerve-force, to disruptive and inco-ordinated action, in fact; and the concentration of this tendency in particular localities, or about particular foci, will mainly determine the character of the neurosis in question. The immediate antecedent of the attack is a condition of unstable equilibrium and gradually accumulating tension in the parts concerned, while the paroxysm itself may be likened to a storm, by which this condition is dispersed and equilibrium for the time restored."[1]

At first sight, this hypothesis seems sufficiently comprehensive, for there is a conspicuous nervous element alike in migraine, asthma, and epilepsy. Yet, after all, it is in comprehensiveness that the hypothesis will be found to fall short. But to show this, it will be necessary to enlarge our clinical horizon, and include therein another recurrent affection, namely, acute articular gout.

In gout, the phenomena illustrating accumulation and discharge are as patent as in any of the paroxysmal neuroses. The paroxysm is often preceded by a period of indifferent health, of bodily and mental discomfort, and succeeded by a

[1] *Megrim and Sick Headache*, 1873, p. 336.

period of restored or accentuated well-being, physical and psychical; and the paroxysms are commonly infrequent in proportion to their severity, frequent in proportion to their mildness. Moreover, the paroxysms of acute articular gout are interchangeable with the paroxysms of migraine, asthma, and epilepsy: from authenticated medical literature there can be quoted (1) cases in which the onset of acute gout has been exactly coincident with the complete subsidence, temporary or even permanent, of long-standing migraine,[1] asthma,[2] and epilepsy,[3] and (2) others marked by converse substitutions.

Hence it is reasonable to suppose that the accumulation which precedes, and the discharge which accompanies, the acute gouty paroxysm, are similar in nature to the accumulations and discharges which occur in connection with the migrainous, asthmatic, and epileptic paroxysms. Yet it could hardly be seriously contended that gout depends upon the accumulation, and indicates the discharge, of nerve-force. We are driven, therefore, to reconsider the nature of the accumulations and discharges occurring in connection with the paroxysmal neuroses with which gout is interchangeable.

Now in order to determine the nature of the pre-paroxysmal accumulation in any of the recurrent affections under consideration, the most obvious and direct method would seem to be to determine the nature of the paroxysmal discharge. And it will be found that in three of the paroxysmal affections under consideration, namely, acute gout, asthma, and major epilepsy, there is an unmistakable discharge of carbonic acid.

Acute gout is a pyrexia lasting "from two to seven, eight or ten days" (Duckworth)[4]; and many, if not most, pyrexias involve an increase in the output of carbonic acid (Liebermeister, Leyden, Fränkel, and others).[5] Further, in acute gout, Magnus Levy has demonstrated an increase in the oxygen intake amounting to 5 or 10 per cent.: this, of course, implies an increase in the carbonic acid output. In asthma and major epilepsy, there is not, so far as I know, any such demonstration

[1] *Megrim and Sick Headache*, Liveing, 1873, p. 400.
[2] *Clinical Medicine*, Trousseau, New Syd. Soc., Vol. IV., p. 380.
[3] *Gout and Rheumatic Gout*, Garrod, 1876, p. 377.
[4] *Treatise on Gout*, 1890, p. 329.
[5] Ziemssen's *Handbook of General Therapeutics*, 1885, Vol. I., pp. 203, 204, 205.

existent. But such indeed would be superfluous, since both paroxysms imply increased muscular exertion; and muscular exertion, whatever its origin or form, always involves a material increase in the carbonic acid output.

Turning now to migraine, we do not find (except perhaps in some children in whom migraine is associated with pyrexia) any discharge, that is, increase in the output of carbonaceous material: indeed, it seems certain that the usual environment of the migraine paroxysm (complete rest in a darkened room) insures a material decrease therein. But, on the other hand, we do find in many paroxysms (and these are the only paroxysms which concern us here) a very marked restriction in the carbonaceous income. During a typical migraine paroxysm, the intake of food is greatly restricted, usually abolished, through anorexia; and, as pointed out by Lauder Brunton,[1] the movements of the stomach, the secretion of the gastric juice, and the process of absorption, are all arrested. Hence there is an intermission in the ordinary carbonaceous income from the alimentary canal during such migraine paroxysms—an intermission which may last for 12, 24, or even more hours, in accordance with the severity of the attack. Now, since combustion is continuous during life, it is obvious that a cessation of income, equally with an increase of expenditure, would conduce to the dispersion of a prior accumulation. There would be, in short, a virtual, though not an actual, discharge of carbonaceous material during such migraine paroxysms.

These considerations led to the framing of a provisional hypothesis, which may briefly be stated to be as follows: *That the recurrent affections—migraine, asthma, major epilepsy, and acute articular gout—depend primarily upon an accumulation of unoxidised, or imperfectly oxidised, carbonaceous material in the blood; and that each paroxysm is a conservative measure adapted to disperse such accumulation.* The fate of this, as of all hypotheses which are as yet insusceptible of direct experimental demonstration or disproof, must of course be decided solely by its conformity, or non-conformity, with verified or verifiable facts.

Now, although it was framed some seven years ago, I have

[1] *Actions o Medicines*, p. 394.

hitherto failed to find in medical literature any recorded observation, clinical or pathological, which is at all necessarily inconsistent with this hypothesis. On the other hand, the well-accredited observations, which it is capable of explaining and correlating, are very numerous. They are so numerous, indeed, as to be impossible of inclusion within the restricted limits of any single article, or series of articles. I must refer, therefore, those who are anxious to go fully into this question, to my work, *The Food Factor in Disease*,[1] in which I have endeavoured to collate and arrange in their logical order, some portions of the great mass of circumstantial evidence scattered through the records of medicine. Here it is impossible to do more than try to indicate, in briefest outline, the nature of the evidence, and the probable bearing which the conception, if accepted, will have on the classification of physiological and pathological processes, and on the treatment of disease, preventive and curative.

In an individual under average modern conditions, the blood is being supplied at frequent intervals, if not indeed continuously, from the alimentary canal with both nitrogenous and carbonaceous material. It is improbable that the nitrogenous material accumulates to any extent within the system, since the nitrogenous output is determined almost wholly by the nitrogenous intake; this, at least, in nitrogenous equilibrium, the normal condition of the adult organism. On the other hand, it is known that carbonaceous material is capable of accumulating within the system; but it is assumed, perhaps indeliberately, that such accumulation occurs invariably in the extravascular tissues, in the form of fat, glycogen, &c. Now it will not, I think, be difficult to show, deductively from admitted physiological principles, that this optimistic assumption is unwarranted,—that carbonaceous material may in some circumstances accumulate within the general blood-stream, and that such accumulation constitutes a frequent factor of pathological action. To the condition of the blood containing such accumulation, I have for convenience applied the term "hyperpyræmia" (Greek πυρεῖα = fuel).

The carbonaceous income of the blood depends upon the carbonaceous intake, and upon the efficiency of the functions

[1] Longmans, Green, & Co.

of digestion and absorption. The carbonaceous expenditure of the blood is regulated to some extent by the carbonaceous income, but it depends absolutely upon the efficiency of the functions of combustion, anabolism, and hæmorrhage. A near approach to uniformity in the constitution of the blood, as regards the amount of its contained carbonaceous material, may be postulated as a necessity of the organism ; and such must depend upon a certain balance between the carbonaceous income and the carbonaceous expenditure. Consequently, hyperpyræmia will depend either upon a relative excess of income, or, what of course comes to exactly the same thing in this connection, upon a relative deficiency of expenditure.

Now, the evidence which goes to show that hyperpyræmia may constitute a factor in the paroxysmal neuroses, migraine, asthma, and epilepsy,[1] consists of several long series of observations, from which may be inferred the following generalisation: *Whatever tends to reduce the carbonaceous income, or increase the carbonaceous expenditure, of the blood, tends to prevent, alleviate, or disperse; whatever tends to increase the carbonaceous income, or decrease the carbonaceous expenditure, of the blood, tends to initiate, precipitate, or intensify the paroxysms of migraine, asthma, and epilepsy.*

In considering in some detail the various series of observations on which this generalisation is based, it will be convenient to refer in reverse order to the different factors in the income and expenditure of carbonaceous material.

Hœmorrhage. — It will be admitted that hæmorrhage involves, *inter alia*, a direct loss of carbonaceous material. Hence menstruation, the only physiological form of hæmorrhage, must be regarded as one item in the carbonaceous expenditure of the blood. Conformably, numerous cases can be quoted from medical literature in which the sudden suppression of the menstrual flow, from accidental causes, has been followed by the commencement, recrudescence, or intensification of migraine,[2] asthma,[3] and epilepsy[4]; and,

[1] The evidence in support of a hyperpyræmic factor in acute articular gout has been summarised in some detail in a paper, entitled "The Carbon Factor in Gout," in the *New York Medical Record* for June 17, 1905.

[2] *Clin. Med.*, Graves, New Syd. Soc., Vol. II., p. 351.

[3] *On Asthma*, Hyde Salter, 1868, p. 393.

[4] *Epilepsy*, Gowers, 1901, p. 34.

conversely, the establishment or re-establishment of the menstrual process has been often successful in the treatment of all three affections.

Though frequently denied, there can be no reasonable doubt that checked menstruation is not rarely followed by periodic losses of blood from outlets other than the uterus; and such vicarious hæmorrhages will often be found to have similar relationships with migraine, asthma, and epilepsy.

But many persons, other than non-pregnant females, during the menstrual period of life, suffer from recurrent losses of blood; and such hæmorrhages again will often be found to have inverse relations with migraine [1] and asthma,[2] if not with epilepsy. The view that recurrent hæmorrhages may be conservative is as true now as when Trousseau wrote: "Every physician knows that the supplementary functions, which are constituted by habitual fluxes, serve useful purposes, and can only be interfered with when careful management is adopted." [3]

Anabolism.—The most important processes coming under this head are utero-gestation, lactation, and fat-formation. All these are specialised anabolic functions of the nitrogenous bioplasm, though this fact is not often insisted upon in the case of fat-formation; and all are important items in the carbonaceous expenditure of the blood.

During utero-gestation, carbonaceous not less than nitrogenous material is being withdrawn in considerable quantity from the maternal blood; and the same is true of lactation. Conformably, it will be found that many migraines,[4] asthmas,[5] and not a few epilepsies,[6] remain in complete abeyance from the commencement to the end of pregnancy; and the freedom may continue (though this seems less common) throughout the subsequent period of lactation.

The functional capacity for fat-formation varies widely in different individuals, and in the same individual at different periods, in accordance with a variety of circumstances, known

[1] *Megrim and Sick Headache*, Liveing, 1873, pp. 325, 326.

[2] *The Food Factor in Disease*, Hare, 1905, Vol. I., p. 315, and Appendix Case LXXXII.

[3] *Clin. Med.*, New Syd. Soc., Vol. IV., p. 399.

[4] *Megrim and Sick Headache*, Liveing, 1873, p. 47.

[5] *On Asthma*, Hyde Salter, 1868, p. 392
Epilepsy, Gowers, 1901, p. 212.

and unknown. Conformably, it is often to be observed that the rate of fat-formation has a distinct inverse relation with migraine and asthma, if not with epilepsy. Cases are not infrequent in which recurrent sick headaches (and Gowers states that all sick headaches are migraine) of some years' duration have ceased concurrently with a marked increase in the rate of fat-formation, leading eventually to corpulence ;[1] and Berkhart records three cases in which asthma ceased concurrently with the supervention of enormous obesity.[2] It all such cases it may be, of course, that the cessation of the neurosis was the initial factor and led to the nutritional change ; but it would be impossible to disprove the converse. And it seems highly probable, *à priori*, that in some cases an increased functional capacity for fat-formation, just like the supervention of pregnancy, disperses hyperpyræmia, and thus removes the necessity for the recurrent pathological expenditure involved in migraine and asthma.

Combustion.— Undoubtedly the main item in the carbonaceous expenditure of the blood is combustion. This may be regarded as a katabolic function of the nitrogenous bioplasm. It is, of course, continuous during life, but varies widely in degree at different times and in different circumstances.

There is a well-marked fluctuation in combustion throughout the diurnal cycle. Combustion is at its minimum in the small hours of the morning ; thenceforward there is a steady rise until about noon ; during the afternoon combustion is steady ; while during the evening a fall sets in, and this is continued down to the minimum which occurs about 3 or 4 a.m.[3] Now, it will be admitted that, in ordinary circumstances, the inflow of carbonaceous material from the alimentary canal is continuous, though not, of course, uniform. It follows that the tendency to hyperpyræmia will largely depend inversely upon the rate of combustion. Hence we shall expect a tendency to hyperpyræmia during the small hours of the morning. And comformable with this expectation is the well-known fact that the

[1] *The Food Factor in Disease*, Hare, Vol. I., p. 237.

[2] *Bronchial Asthma*, p. 147.

[3] Schäfer's *Text-book of Physiology*, Vol. I., p. 800; also *Nat Hist. of Digestion* Lockhart Gillespie, 1898, p. 336.

paroxysms of migraine,[1] asthma,[2] and, to a less extent, of epilepsy,[3] are peculiarly apt to commence at this time. The peculiarity is perhaps most conspicuous in the asthmatic paroxysms which commence suddenly; but it is almost equally so in migraine, if allowance is made for the insidious onset of this neurosis. The initial sensory symptoms of migraine, such as flashes of light, may not awake the patient, but frequently lead to dreams of storms, fires,[4] &c.

The diurnal fluctuation in combustion depends primarily upon the alterations of the sleeping and waking states. Hence, in those who work at night and sleep by day, the fluctuation is reversed, or approximately so.[5] Now, it is an indubitable fact, which, however, seems to have attracted but little notice, that in night workers, migraine and asthma, at any rate, commence, for the most part, well on in the daytime, towards the termination of their daily sleep.[6] This will not be questioned further by any who will make pertinent inquiries amongst journalists, hospital nurses, and policemen.

Physical exercise increases four- or five-fold the rate of combustion[7]; and regular physical exercise is found to be one of the most potent of all therapeutic measures for preventing, checking, or rendering less frequent, or less severe, the paroxysms of migraine (Liveing),[8] asthma (Hyde Salter),[9] and epilepsy (Reynolds,[10] Broadbent,[11] Spratling[12]). There is a mass of evidence bearing on this point which cannot be detailed here. Conversely, it will be found that the commencement of these neuroses dates not infrequently from the abandonment, sudden or gradual, of some habitual physical exercise.[13] The same was noted by Sydenham in the case of gout.[14]

[1] *Theory and Practice of Medicine*, Bristowe, 1884, p. 1127.
[2] *On Asthma*, Salter, 1868, p. 408.
[3] *The Food Factor in Disease*, Hare, 1905, Vol. I., p. 226.
[4] *Revue de Méd.*, 10 Feb., 1903, p. 127.
[5] Schäfer's *Text-book of Physiology*, 1898, Vol. I., p. 802.
[6] *The Food Factor in Disease*, Hare, 1905, Vol. I., p. 229 *et seq.*
[7] *Text-book of Physiology*, Foster, 1895, p. 844.
[8] *Megrim and Sick Headache*, Liveing, 1873, p. 451
[9] *On Asthma*, 1868, p. 309.
[10] *On Epilepsy*, p. 335.
[11] *Brit. Med. Journal*, January 4, 1902.
[12] *Brit. Med. Journal*, April 11, 1903, p. 871.
[13] *The Food Factor in Disease*, Hare, 1905, Vol. I., p. 221 *et seq.*
[14] Works of Sydenham, Syd. Soc., 1850, Vol. II., p. 123.

It has been pointed out that pyrexia, in many if not all cases, involves great increase in the rate of combustion. And it has frequently been shown that pre-existing asthma (Trousseau),[1] and pre-existing epilepsy (Bourneville, Bonnaire, Séglas, and others[2]) tend to cease during the course of intercurrent pyrexia. I cannot find the same observation recorded of migraine. Yet the inverse relation between migraine and pyrexia is quite conspicuous,[3] and in this lies the explanation of the salutary influence of the seton (recently revived by Walter Whitehead[4]) in this affection.

We now turn attention to the main items in the carbonaceous income of the blood.

Absorption.—Other things equal, the tendency to hyperpyræmia will depend directly upon the absorption of carbonaceous material from the alimentary canal. The absorption will depend, *inter alia,* inversely upon the rate of the alimentary current in the intestinal canal. Hence, conditions which accelerate the current, especially in the small intestine where absorption of nutriment is greatest, will restrict absorption, and so lessen or defer the tendency to hyperpyræmia. Purgatives of all kinds hasten the alimentary current, and calomel "has a peculiar stimulant action on the duodenum and ileum."[5] Conformably, it will be admitted that purgation, especially, I think, purgation by calomel, is of material use in the therapeutics of migraine, asthma, and epilepsy. It is true that the relief so afforded is but temporary; but it is equally true that the restriction of the carbonaceous income so attained is but temporary.

Digestion.—Absorption depends, *inter alia,* upon digestion. Hence, other things equal, the tendency to hyperpyræmia will depend directly upon the efficiency of digestion. Conformably, numerous examples can be given in which dyspepsia distinctly alternated with migraine and asthma, if not with epilepsy, in which, in other words, the development of dyspepsia dispersed,

[1] *Clin. Med.*, New Syd. Soc., Vol. I., p. 625.
[2] *Epilepsy*, H. A. Hare, 1890, p. 222.
[3] *The Food Factor in Disease*, Hare, Vol. I., p. 242.
[4] *Brit. Med. Journal*, 1901, February 9, p. 335.
[5] *Pharmacology, Therapeutics, and Materia Medica*, 1885, p. 355, Lauder Brunton.

for the time being, the recurring paroxysms of migraine[1] and asthma.[2]

Again, it is known that "when an animal is fed simply on non-nitrogenous food, death soon takes place; the food rapidly ceases to be digested and starvation ensues" (M. Foster[3]). Hence it is not unreasonable to suppose that a material reduction of the proteid intake would reduce the efficiency of the digestive process. Thus, a due restriction of proteid would tend to disperse hyperpyræmia. This constitutes, to my mind, the only tenable explanation of the success claimed, and justly claimed in many cases, for vegetarianism, or modified vegetarianism, in the treatment of migraine, asthma, and epilepsy. Haig, who believes that all three disorders depend upon uric-asmia, finds it necessary, not only to cut off the purin foods, which are admittedly the main source of exogenous uric acid, but also to reduce within certain limits the intake of purin-free proteid (cheese, for example) which is now known not to increase appreciably the formation of uric acid. Hence, it is reasonable to believe that the reduction in the proteid is the essential item in Haig's well-known dietetic system. At any rate, the facts adduced in the succeeding paragraph go to show that, in migraine and asthma, the purin intake *per se*, and therefore, the passage of uric acid through the blood on its way to renal excretion, is negligeable.

The Carbonaceous Intake.—The digestion of carbonaceous material depends, *inter alia*, upon the intake of carbonaceous material. Hence, other things equal, the tendency to hyperpyræmia will depend directly upon the carbonaceous intake. And if it is true that hyperpyræmia is an essential factor in migraine, asthma, and epilepsy, it should be possible in some cases to disperse these recurring paroxysms by simply restricting the carbonaceous intake. Such, indeed, may be regarded as the final test of the truth of the hypothesis preferred in this article.

Restriction of the carbonaceous intake may best be achieved, (1) by cutting off sugar, and all articles containing any form of sugar; (2) by carefully graduating (by weight) the daily intake

[1] *The Food Factor in Disease*, Hare, 1905, Vol. I., p. 47.
[2] *On Asthma*, Hyde Salter, 1868, p. 256 *et seq.*
[3] *Text-book of Physiology*, 1895, p. 833.

of starch-containing foods, so as to attain the minimum consistent with adequate nutrition in each individual case; (3) by similarly graduating the intake of fats if necessary; and (4) by throwing the onus of nutrition to a considerably greater extent than previously upon fish, lean meat, green non-starchy vegetables, and gelatinous soups.

Space does not remain for detailed cases showing the results of this régime. But a general review of such results may be attempted. With regard to migraine and asthma, it may be said with some confidence: (1) that practically all cases receive benefit, at least in some slight degree; (2) that many receive marked benefit to the extent that the paroxysms become distinctly less frequent and less severe; (3) that, in some, the paroxysms rapidly cease, and remain in complete abeyance so long as the change in diet is maintained; and (4) that in a few, after a certain time, varying with the case, the special diet may be largely modified without recurrence of the paroxysms.

With regard to epilepsy, the results, as might be anticipated, are much less satisfactory. The most that can be said at present is: (1) that in no case have the paroxysms been rendered more frequent or more severe; (2) that in many cases of major epilepsy, the paroxysms were rendered less severe, though not less frequent; (3) that in some the paroxysms were rendered less frequent and less severe; (4) that in a very few the paroxysms ceased during the continuance of the altered diet, and that without drugs of any kind; but (5) that in the great majority the inhibitory action of the bromides seemed to be distinctly enhanced.

From the clinical evidence adduced, we may, I think, conclude provisionally that hyperpyræmia is a common humoral factor, at least in some cases, of the special pathological variations of vaso-motor action which constitute migraine, asthma, and epilepsy; and that the paroxysms of these affections can be regarded in the light of conservative, though not necessarily of course, salutary, reactions adapted to disperse hyperpyræmia. But hyperpyræmia implies the relative failure of those physiological functions, which together comprise the carbonaceous expenditure of the blood,—functions which may be spoken of collectively as "decarbonising" functions. Hence,

the paroxysmal measures referred to may be regarded as pathological reinforcements of inadequate physiological functions,—as pathological functions, in short. We cannot, indeed, refer to them all as pathological *de*carbonising functions, since, as pointed out, one (namely, migraine) operates through restriction of income, not through increase of expenditure. We may, however, group them all under the more inclusive term, pathological *a*carbonising functions.

Before asking any to accept the above generalisation, I hasten to lay down the following cautions :—

1. The humoral is but one of a number of factors which together go to make up the causation of these paroxysmal neuroses ; and it is certain that, in many cases, the factors other than humoral are more dominant in causation, and therefore more worthy of therapeutic attack in the first place, than the humoral factor.

2. In many cases of migraine and asthma—how many I do not know, but certainly in the great majority of cases of epilepsy—the hyperpyræmia determining the paroxysm must be regarded as merely a relative, not an actual, hyperpyræmia : in other words, the implied carbonaceous accumulation is pathological in amount only as regards the pathological function concerned, physiological as regards the functions of the organism generally. This depends no doubt on the dominance, in such cases, of the factors other than humoral.

"CHOREA GRAVIDARUM."

A Short Monograph, with Details of Two Recent Cases.

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As cases of rare diseases are always of interest to the profession, two new ones of chorea gravidarum, a disease standing foremost in the rank of the rarer complications of pregnancy, are worthy of note. It is unfortunate that, so far, further instances of this affection do not seem to have thrown much additional light upon its obscure ætiology; but a morbid condition, in which the mortality, as shown by various statistics, is between twenty and twenty-five per cent., and which is so rare, that Jellett states that of 20,000 deliveries at the Rotunda Hospital not a single case is recorded, deserves our closest observation and most careful research. Before giving the notes of two cases under my observation, it might be well to briefly review the few facts that are known about this peculiar condition; and perhaps a short comparison with chorea minor, Huntington's chorea, and general convulsive tic, diseases which, though having their own marked peculiarities, yet appear to have a good many points in common with the chorea of pregnancy, might not be out of place.

To be able to prove an intimate connection between the subject of this paper, and one of the other and better known forms of chorea, would be an important step in establishing our knowledge of the affection on a more trustworthy basis; but I am disposed to think that, while the pathology of the subject remains so obscure as it is to-day, much advance cannot be hoped for.

It is not unreasonable, perhaps, to look for a common cause for chorea minor and chorea gravidarum, because quite a large percentage of the latter have had chorea minor in their childhood, some observers stating that one in every three or four have been affected before puberty.

If a patient had been the subject of chorea in her youth, it would not be a matter for surprise to find that the great additional stimulus to the nervous system, superimposed by

pregnancy, should determine a renewal of the attacks, which had perhaps for years been dormant; just as would any emotional excitement tend to precipitate a new attack in a choreic child. Now, as we know, there exists frequently an intimate connection between rheumatic fever, endocarditis, and chorea minor, and, again, between the latter and chorea gravidarum; it is, therefore, quite conceivable that the much-abused micro-organism will be held responsible for yet another ailment.

In contrasting the forms of chorea, we find that the preponderance of the female sex in chorea minor seems to indicate that the female, with her more delicately balanced, and therefore more easily upset, nervous system, is more susceptible to the stimulus, or poison if such it be, which disturbs the function of the cortical motor neurons. The same must then, of necessity, apply to chorea gravidarum. In both varieties of chorea, various stimuli tend to increase the choreiform movements. In the minor form, a fright, in the gravid, the sensation of "quickening," will sometimes make movements, which might be described as "fidgety," become so violent as to cause the patient to injure herself. In both the classes mentioned, recurrence is the rule, and, in both, voluntary movements are interfered with.

Mental complications, it is true, are much rarer in chorea minor than in chorea gravidarum; but in pregnant women we recognise an acute puerperal mania without any previous history of chorea. Now, if the ordinary phenomena of childbirth can originate of themselves symptoms of acute mania, probably it is true, in a person already predisposed, is it not much more likely that, if a choreic person *may* have morbid mental symptoms, and this person a puerperal woman, that still more is a puerperal woman, who has already been the subject of chorea, likely to have mental trouble?

With regard to the effect of the drug arsenic in the two varieties, we are aware of the fact that heroic doses exert a marked beneficial influence over chorea minor, while it has but little, if any, effect in the chorea of pregnancy. Whereas, in the latter case, until the uterus is empty, a powerful stimulus to the unstable nervous system is in constant action, now apply powerful stimuli to a girl who is the subject of chorea minor, such as frightening or slapping her, banging doors, &c.,

in themselves no more powerful excitants to her than are uterine contractions, or fœtal movements to the chorea gravidarum patient, and I doubt whether arsenic in any dose would be of much avail.

As I mentioned before, in the two varieties of chorea recurrence is common ; in the gravid form, well over 60 per cent. of the women attacked have their first attack in their *first* pregnancy, and the large majority of the patients are under 30 years of age. Cases have been recorded where 2-paras have been attacked for the first time with rheumatic fever after the birth of their second child, and, who, in the pregnancy following, have developed their first fit of chorea. Such cases, although of rare occurrence, tend to strengthen the evidence in favour of an intimate connection between rheumatic fever and chorea gravidarum. Huntington's chorea has but little in common with chorea of pregnancy as compared with the minor form. Huntington's hereditary chorea is as commonly seen in men as in women, and, as its name implies, there is the history of heredity. It is steadily progressive, is incurable, and tends to dementia ; while chorea gravidarum usually either progresses rapidly to a fatal issue, or disappears entirely before or after the pregnancy is terminated, when, if it recurs in a subsequent pregnancy, the interval is invariably entirely free from symptoms.

The first symptoms of chorea gravidarum, viz., twitching of muscles or clonic spasms, usually appear about the third or fourth month of pregnancy ; but the onset of quickening may be the starting point. The choreiform movements almost invariably persist until after the termination of the pregnancy, when they may gradually cease ; but in very bad cases the patient may become maniacal, and eventually die from exhaustion. Chorea of itself tends to induce premature emptying of the uterus, and, on the whole, the prognosis of the case then becomes better, owing to the removal of such a powerful stimulus to the central nervous system. Indeed, in severe cases, artificial emptying of the uterus has to be resorted to when the other and milder treatments have been tried without avail. Unfavourable symptoms are when the movements are so continuous and violent as to seriously interfere with sleep. In such cases the patient soon becomes

exhausted, and sometimes is quite unable to speak or to swallow, and want of nourishment then aggravates the case, since nutrient enemata are so frequently immediately expelled in rectal alimentation.

In the treatment of this condition, everything that has been used in chorea in general has been tried for chorea gravidarum; for instance, rest, avoidance of excitement of any kind, bromides, arsenic, salol, sedatives, and inhalations of chloroform and induction of labour in aggravated cases; but the high mortality of the disease shows that, up to the present time, we are not acquainted with any drug or therapeutic measure which will exert unfailingly any permanent, specific, beneficial influence.

It fell to my lot this past summer to have under my care, within two months of each other, two cases of chorea gravidarum. In severity they were the two extremes, the first very mild, presenting, as this affection goes, no point of peculiar interest, and coming to a fairly rapid and favourable termination; the other, a very severe case, in which the strongest measures had to be adopted, and which, in spite of all treatment, developed acute mania, and rapidly progressed to a fatal termination.

Case I.—Mrs. M. R., primipara, pregnant $7\frac{1}{2}$ months, was noticed by her relatives, for some months previous to her admission to hospital, to have become somewhat irritable in temper, while, later, twitching of the facial muscles and of the fingers was seen. These symptoms were observed to increase in severity under the influence of any little excitement. Voluntary actions were slightly interfered with, but she slept well and took plenty of nourishment. This trouble continued until her confinement, which took place at full term, when it gradually disappeared without any further complication. As a child, she had no chorea, nor had any of her relations. She never suffered from rheumatism, nor from heart trouble of any kind. She appeared to be of a nervous and impressionable temperament.

Case II.—Mrs. R., 3-para, æt. 23.

Family History.—Father died of pneumonia, mother of cardiac disease. No history of any relations having had epilepsy or any mental trouble. One sister had an attack of chorea three years ago when 18 years of age.

Personal History.—Past health excellent. Never had chorea as a child, no history of rheumatic fever or heart affection. Married four years. She has been pregnant three times, and has two living children. In her first pregnancy neither she nor her husband noticed any twitchings or other symptoms of chorea.

When eight months advanced in her second pregnancy she began to notice slight twitching in her right arm, and occasionally in the right side of her face ; but it never interfered with the performance of her household duties, and when the baby was born the symptoms disappeared entirely. The patient is stated to have been obliged to wear glasses for the past four or five years on account of pain in her eyes and headache.

During her third and last pregnancy the patient enjoyed excellent health for the first five months, with the exception of occasional severe headaches. On June 18th last, when about five months pregnant, she came under my care complaining of twitching in her right arm, and stating that for some weeks previous to this she had noticed the same arm weak and feeling numb. Just before the onset of these symptoms she fainted once without apparent cause.

About the same time, her husband noticed that, although previously a very even-tempered woman, she became irritable and absent-minded, and, to use his own phrase, she said "queer things," suddenly introducing into ordinary conversation incidents which occurred years before. The muscular twitching continued until July 13, when it rapidly became worse, the patient involuntarily working her mouth vigorously and darting her tongue in and out. Day by day these symptoms increased in severity, until eventually all her limbs took part in such violently uncontrollable movements, that four nurses were required to keep the patient in bed, and to prevent her from injuring herself. She did not sleep much, but when she did so, the movements for the time being ceased entirely. She spoke clearly but jerkily, and was able to talk rationally about herself and her home. With difficulty she was able to swallow nourishment.

A day or two latter she became unable to speak, although she made an effort to do so, the attempts ending in grimaces

and tossing of the head, accompanied by a peculiar sharp cry. At this time she was no longer able to take nourishment by the mouth.

In the course of treatment, the following drugs, usually administered in such cases, were tried : arsenic, bromides, chloral, hyoscine, hyoscyamine, and morphia ; none, however, appeared to exert much beneficial influence over the disease. When the symptoms became dangerously accentuated, induction of labour was performed under anæsthesia by the combination of Krauze's catheterisation of the uterus, and the method described by me in the *Brit. Med. Journ.* of June 24, 1905 ; but the emptying of the uterus seemed to have no effect in calming the movements. Inhalations of chloroform were the only means of quieting her ; but, on recovering from the effects of each administration, the movements became worse than ever. Her aspect soon began to change, and her eyes developed a wild look. She no longer recognised her husband, or friends, and she became excessively violent.

The transition stage from agitation and loss of control to insanity was so gradual as to be hardly perceptible ; but when it became obvious that she had developed acute mania, she was transferred to the Richmond Asylum, where she died from exhaustion in less than a week after admission.

This last case is of particular interest, as the patient never had chorea previously, except a very slight attack, when carrying her second child. Her first pregnancy was quite free from any symptoms, contrary to the usual rule. The hemianæsthesia and weakness of the right arm are interesting, but are commonly present in such cases.

Too much stress cannot be laid on the fact that, in cases of this rare disease, as in bad cases of hyperemesis gravidarum, if it is decided to empty the uterus in hopes of staying the progress of the affection, the sooner and the more rapidly induction of labour is performed the better. But, in the case under my care, the termination of the pregnancy had no good effect, and if in the future we are to find a cure for this dread, but fortunately rare, complication of pregnancy, we must first, I think, learn the true cause of it. Whether it is a functional disorder of the cortical motor neurons, or capillary cerebral emboli, or what, will remain for the pathologist to tell us.

SOME ASPECTS OF PELVIC APPENDICITIS.

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There is no essential difference between appendicitis occurring in the pelvis, and in any other part of the abdominal cavity. So far as I know its causation and pathology are the same, and any features, which are peculiar to it, depend entirely on environment. When the inflammatory phenomena associated with appendicitis arise in the pelvis, or extend to it, certain viscera, or parts of viscera, which have delicate physiological functions to perform, and which communicate with the surface of the body, may be affected. When the peritoneum, covering the bladder, is involved, there is usually interference with the act of micturition, which may be frequent and painful, or there may be retention, or more rarely incontinence. The retention in adults is because the patient is unable to empty the bladder, but in children the pain experienced, on emptying the latter may be so great, that they voluntarily hold their water, until the bladder is very much distended. So with the rectum, there may be pain when it is emptied, either of flatus, or fæces, and the same applies to the functions of the vagina. At a later stage, when the inflammatory process extends to, and involves the wall of the bowel, as just before the bursting of an abscess, there is frequent painful tenesmus, and a very great increase of its secretion, as shown by the constant escape of mucus from the anus. But these manifestations of the inflammatory process are not peculiar to the parts involved. When an abscess occurs, among the small intestines, the exalted and painful peristalsis takes the place of tenesmus, and there is a copious outpouring of secretion from the intestinal walls, as shown by the frequent onset of diarrhœa. The fact that the parts, involved in pelvic appendicitis, directly communicate with the surface of the body, not only serves to make some of the symptoms more obvious, but proves an inestimable boon in that the means of examination are greatly facilitated.

It is not only when the appendix is actually situated in the pelvis, that it is liable to give rise to symptoms, referable to this region, for the mischief which starts in an appendix, not located in the pelvis, may extend to the latter, and the most urgent features of the illness may be associated with this extension. The appendix commonly hangs over the pelvic brim in whole, or in part, and, in some few cases, the whole cæcum may lie in the pelvis ; but it is not these anatomical variations, which account for the greater number of cases in which pelvic symptoms occur. The pelvis is one of the dependent parts of the great peritoneal sac, in all ordinary positions of the subject, and it is into this part of the peritoneum, so well described by the French "le bassin," that exudations in the vicinity tend to find their way.

Whatever is the usual position of the normal appendix as found in the dissecting or post-mortem rooms, in abscess cases it is most commonly found somewhere in the sulcus on the outer side of the cæcum and ascending colon. With the organ in such a situation, there are two royal routes by which the products of its inflammation may travel :—upwards into the hepatic pouch, or downwards into the pelvis. It is the collections of pus in the pelvis, that have reached that basin from some other part of the peritoneal cavity, that account for the greater number of cases of appendicitis, in which pelvic symptoms are a prominent feature.

THE DIFFERENT GROUPS OF PELVIC CASES.

The clinical features of the cases, that are met with, can best be considered in four groups.

1. The mild cases.
2. The severe cases with pelvic peritonitis.
3. The severe cases with pelvic abscess.
4. The cases with unusual features.

1. *The mild Cases.*—As the characteristic symptoms depend so much on the implication of the walls of the pelvic viscera, it is not likely that those cases, which naturally come under the head of relapsing, or catarrhal appendicitis, will frequently give rise to such symptoms, for the trouble is then usually confined to the appendix itself. The commonest pelvic symptom, in mild cases, is some interference with micturition, and this

usually takes the form of frequency, or hesitation and pain, on starting the act, as in the following case :—

A young woman, suffering from her first attack, had severe pain in the umbilical region and right iliac fossa. It was sufficiently severe to make her shout out and vomit. She was ill for three days, and for two days had frequent painful micturition and pain on defæcation. After the attack passed off, there was nothing to be felt from the belly, but per rectum, a tender finger-like process was easily made out. The appendix was found hanging over into the pelvis, free from adhesions, and the right tube and ovary were normal. The mucous membrane was swollen, and dotted here and there with tiny hæmorrhages.

Mr. H. L. Barnard[1] points out, it is useful to remember, as an aphorism, that if in a case, supposed to be appendicitis, the organ cannot be located in the abdomen, it will be found per rectum. Of course this method must be used with care, and with due regard to the other aspects of the case, otherwise mistakes will be made, as in the case of a young lady, who had suffered from several attacks of abdominal pain, supposed to be appendicular. Per vaginam, a hard tender body was felt lying against the right pelvic wall. This was supposed to be the appendix, with its extremity recurved, but it turned out to be a stone, impacted in the ureter, the appendix being normal.

2. *The severe Cases with Pelvic Peritonitis.*—In the most severe cases, such as come under the head of "fulminating appendicitis," the pelvic symptoms are subsidiary to the severity of the initial attack, or to the grave general disturbance, or are almost at once submerged in the symptoms of general peritonitis. In fact, it may fairly be said that, in the acute cases, the pelvic symptoms are only of localising value in the very early stages, or after the septic processes have localised. Retention of urine is the commonest pelvic symptom, and, on rectal examination, extreme tenderness may be elicited, or the inflamed appendix may be itself felt. A lady of 48 had an attack of acute appendicitis with frequent vomiting. There was pain in the pelvis with frequent, but ineffectual, efforts at micturition, the urine having to be drawn off by catheter. There were no rectal symptoms. In the right lateral fornix, there was extreme tenderness, and movements of the uterus caused pain. When the abdomen was opened, 48 hours after

the onset of her illness, the cavity was found to contain free milky fluid, the appendix hanging entirely over the pelvic brim. It is the cases, which remain limited to the pelvis, or which eventually localise there, that are attended with the most characteristic symptoms. A young man of 21 was sent to see me with a view to removal of his appendix. For some three months, he had been bothered with slight abdominal pain, but no acute illness until two weeks before I saw him. He then had a very severe attack, so severe that he shouted with the pain across the lower abdomen, vomited, shivered, and perspired. There was slight pain at the end of micturition, and it hurt to pass wind. After a day or two, the pain moderated but did not entirely cease. In the right iliac fossa, slight tenderness could be elicited, and per rectum a tender mass was easily felt. I removed the appendix, which lay on the right wall of the pelvis, the tip almost reaching the bottom of the recto-vesical pouch, where it was very adherent. There was no abscess, but the matting of the intestines around the appendix clearly showed that there had been severe pelvic peritonitis. In this case, the rectal examination made one confident that the appendix lay there, and was the cause of the symptoms.

It is this kind of case, occurring in women, which gives rise to so much difficulty in diagnosis, for there is often considerable doubt whether the appendix, or the Fallopian tube, is at fault. Even if it were possible to settle this point, the difficulties would not be at an end, for the trouble may spread from the appendix and involve the tube.[2]

3. *The severe Cases with Abscess.*—There are at least three principal varieties of pelvic abscess depending on appendicitis.

a. Primary; when the appendix lies in the pelvis, and an abscess forms around it.

b. Secondary; when an abscess forms in the pelvis as an extension from one in the right iliac fossa.

c. Residual; this may either result from the localisation of the septic exudate, in cases recovering from a general septic peritonitis, or may be the result of suppuration in the pelvis, following operations for appendicitis.

Fig. 1 illustrates these different varieties. As regards their relative frequency, out of 30 cases operated upon by rectal or

vaginal incision, and of which I have records, 13 were primary, 3 were secondary and 14 residual, of which 3 followed general septic peritonitis, and 11 operation. In the typical cases, the pus collects at the bottom of the pelvis, and floats the intestines up, for such abscesses are beautifully roofed in by the omentum and matted intestines, so that those of large size have a dome-shaped roof. In the female, the uterus, broad ligaments, and vagina are usually anterior relations of the abscess, unless the latter is exceedingly large, when the uterus and appendages may be submerged in the collection. Of course any of the parts in the vicinity may take a share in the formation of the abscess wall, and a case has recently been recorded,[3] where an ordinary ovarian cyst helped to roof in a

Fig. 1. *The different varieties of pelvic abscess.* a. *Primary, appendix in pelvis.* b. *Secondary, extension from abscess on outer side of cæcum.* c. *Residual, there has been a general peritonitis, and pus is localising in the pelvis, right loin pouch, left iliac fossa, and between the intestinal coils.*

pelvic appendicular abscess. In those abscesses, which reach the pelvis by extension from the right iliac fossa, or from the general peritoneal cavity, there may be small intestines between the abscess and the bottom of the pelvis, at some stage of their development, as shown in Figs. 2 and 5. In a patient, who died after an abdominal operation for pelvic abscess, I found the pus had not reached the bottom of the recto-vesical pouch, and was in contact with the rectum about $1\frac{1}{2}$ inches above that point. In front the right half of the bladder formed its wall, and the vesical mucous membrane, opposite the point of contact, was distinctly œdematous and reddened. The collection was roofed in by part of the lower ileum, some coils of the middle of the small intestine, the overhanging cæcum, and the

omentum. But such abscesses eventually reach the bottom of the pelvis, floating up, or displacing, the intestine unless the latter is adherent. The quantity of pus varies within wide limits, some hold as much as two or even three pints; but the usual quantity is between 10 and 20 ozs. No estimate of the size of these abscesses should be attempted until the bladder has been emptied by catheter, and a bimanual examination made.

The onset of these cases may be sudden, or gradual, and, in some, it is so insidious as to lead to the diagnosis of dyspepsia,

Fig. 2. a. *Typical pelvic abscess suitable for incision per rectum, the point at which the opening should be made is shown by the arrow.* b. *Pelvic abscess not suitable for incision per rectum, there is a loop of small intestine at the bottom of the pelvis, and this would be injured by a puncture in the direction of the arrow shown in* a.

or simple colic. The pain is usually at the umbilicus, or below it, and is quite often just above the pubes, and is better marked there than on either side. In the early stages, there is often tenderness and rigidity of the lower part of the abdominal parietes, and if a rectal examination is made, extreme tenderness can be elicited by pressing on its anterior wall. Micturition may be painful, or there may be retention, especially if the patient is confined to bed. The temperature is elevated, and the pulse correspondingly quick; but the rule is the same as with appendix abscess elsewhere, viz., that the temperature is highest before localisation takes place, that it gradually comes

down to a little above normal, or even normal, and that it only re-ascends, should the abscess begin to extend, or to seek its way out. In cases of pelvic abscess, the temperature is not as a rule very high. The pulse remains a little quick, even when the temperature is normal, or near it. The pain is of three kinds, that due to the peritoneal inflammation, that due to exalted peristalsis, and that associated with the tenesmus. The first is not peculiar to this variety of appendicitis, the second commences as severe colicky pain in abdomen, often brought on by the taking of food, and is associated with rumbling, and in the later stage this colic merges into a spasm of rectal tenesmus. The bowels are usually constipated, and there may be so much difficulty in passing flatus that a certain amount of obstruction may be said to exist. In other cases, and in late stages, there may be looseness of the bowels, Nature's effort to rid herself of the pus, and I have more than once seen a pelvic abscess emptied during an attack of diarrhœa. When the abscess points into the rectum, the tenesmus and passage of mucus are most characteristic symptoms.

On local examination there is usually a doughy mass felt above the pubes, it may reach the umbilicus, but is more commonly like a moderately distended bladder. Of course such a swelling depends on the size of the abscess, and may be entirely absent, but, even with a very small collection, it is usual to have a curious sense of resistance above the pubes (*see* Fig. 3). The occurrence of visible peristaltic movements

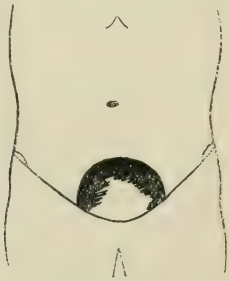

Fig. 3. *Outline of suprapubic swelling produced by a pelvic appendicular abscess.*

over the swelling may demonstrate that it is covered by intestine, but percussion will settle the matter, for it is only in very large collections that there is dulness. Part of the swelling may be produced by distension of the bladder; but the passage of the catheter will at once show how much this has to do with it. There may, in addition, be masses in either iliac fossa. On rectal examination, the anus is often found patulous, the mucous membrane is congested and œdematous, and a rounded tender mass is felt above the prostate, in the case of a large abscess bulging the rectal wall back towards the hollow of the sacrum (Fig. 2, *a*). Bimanually, the two swellings are found to be continuous, and fluctuation may occasionally be made out. Abscesses, primary in the pelvis, may extend up towards the abdomen, and when they reach the pelvic brim, they travel, viâ the gutters, on either side of the cæcum and colon (Fig. 4). These extensions may be very readily felt from above, and for some time after the collection has been drained per rectum. In one case, that I watched, such a mass took 17 days to disappear.

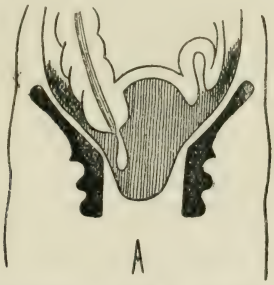

Fig. 4. *Primary pelvic abscess which is extending upwards towards the general cavity of the peritoneum and into either iliac fossa.*

The *secondary pelvic abscesses* are due to an extension from an abscess on the outer side of the cæcum, they creep down the right wall of the pelvis, and gradually fill up the recto-vesical pouch. Such extensions are really very common in a small way, but are only discovered on operation; and it is only occasionally that the secondary collection becomes so large as to attract the most attention. Should this happen

the pelvic abscess may for a time entirely mask the trouble in the right iliac fossa, and sometimes after draining such a pelvic collection per rectum, it is necessary to open the original abscess from above. As a typical example of secondary abscess, I may quote the case of a man of 32, sent to the infirmary as an appendix abscess. He had been ill for nine days, and, during the last three, there had been difficulty in starting micturition, with pain during the act. On the morning of admission, he had retention, necessitating the use of a catheter, but there were no rectal symptoms. In addition to the lump in the right iliac fossa, there was a hard, tender mass on the right wall of the pelvis; but it did not bulge into the rectum. The operation was conducted through an oblique incision in the right iliac fossa. The appendix lay coiled in such a way, that the convexity of the loop, which it formed, lay just on the pelvic brim. At this point, there was a perforation, so that whatever escaped from it flowed straight down by the right pelvic wall. Near its base, there was another perforation, which accounted for the abscess in the iliac fossa. The two collections were directly continuous; both were drained from above, the patient making a good recovery.

In a very unfortunate case, which I recently saw in the post-mortem room, three days after an operation for an appendix abscess, as much as half a pint of pus was found completely shut off in the pelvis, and this had been entirely overlooked. There were no signs of general septic peritonitis, and no pus in the hepatic pouch, and as the appendix lay on the outer side of the cæcum, it was fair to assume that the pelvic abscess was an extension.

The *residual abscesses* are the most interesting. It is now generally recognised that patients may recover from general septic peritonitis, and that many of them do so by the localisation of septic material as residual abscesses. These collections may form anywhere in the abdomen, but they are commonest in the "ponds and gutters" of the peritoneal cavity, of which the principal are the loin-pouches, over the right lobe of the liver, around the spleen, the lesser sac, and the pelvis. The abscesses may be multiple, and a patient, who has weathered the stormy sea of a general infection of the peritoneum, may

succumb to septic absorption from localised collections; but even the worst cases may recover.

So far as we are concerned, pelvic abscess from this cause may occur alone, or be associated with any of the other varieties, and it is not at all uncommon to find a large abscess in the pelvis, associated with one over the right lobe of the liver, in a patient so far recovered from a general septic peritonitis.

I give one illustrative case. The patient was a boy of 15, who had often suffered from mild attacks of appendicitis. He was in his usual health until six days before admission to hospital, when he was seized with pain, diffused over the whole abdomen, but worse at the umbilicus. On the next day, the pain was so bad that he could not sleep, and on the following day he had most acute pain, lasting from noon until late evening, when the severe pain passed off, becoming localised as a dull aching in the right flank. During this day, he vomited. On the next day at 3 a.m., he was awakened by a worse attack of pain, which started in the right iliac fossa; he was "doubled up" and vomited. All the week, he had pain on defæcation, and on the last two days frequent painful micturition, and severe night sweating. On admission to the hospital the boy looked exceedingly ill, the abdomen was tender and rigid, and the question of immediate operation was raised. Next morning the case presented an aspect so different from that of the previous evening, that those, who saw him then for the first time, wondered how so serious a view could have been taken on the previous day. Nine days after the onset of his illness, he appeared to be in very good general condition, and presented only the clinical features of a large pelvic abscess. This was opened per rectum under an anæsthetic, and it was remarked at the time how safe a proceeding this was. Within a few hours the boy was dead. At the necropsy I found comparatively large collections of pus here and there among the intestinal coils, there was pus in the hepatic pouch, and a big collection over the right lobe of the liver.

This interesting subject has been dealt with in previous papers by Mr. Rutherford Morison,[4] Mr. H. L. Barnard,[5] and by myself.[6]

The other variety of residual abscess is equally important It occurs after operations for acute appendicitis, or appendix

abscess in the right iliac fossa, and is either due to the subsequent suppuration of a collection of serous fluid, such as is often met with in the pelvis in acute cases, or it arises from the extension of a septic focus, often seen at the primary operation, where lymph and a little pus are found on the small intestine occupying the pelvis. For instance, a young man of 27 was operated upon at the conclusion of the third day of an acute attack. The appendix lay in the sulcus, on the outer side of the cæcum; there was very little pus, but a good deal of œdema and lymph. There was some clear fluid in the pelvis, which was not purulent. The appendix was removed, and the area drained with gauze. After the operation, the condition of the patient was never quite satisfactory. He was depressed, had a dirty tongue, and could not sleep. About the 12th day, he began to complain of rumbling in the bowels. On the morning of the 14th day, the symptoms were like subacute intestinal obstruction, but the bowels were well moved after castor oil. An indefinite mass was detected in the lower abdomen, and per rectum a tender bulging swelling could be felt rather higher up than usual. Under an anæsthetic, the mass in the rectum was punctured, and gave vent to about a pint and a half of most foul pus. After this, he made an immediate and complete recovery. It is interesting to note that, with all this pus in the abdomen, the temperature was never above 100, and, on the morning that the abscess was opened, it only reached 97·6. Similarly the pulse only varied between 76 and 80. Pelvic residual abscesses, after operations for acute appendicitis, do not always form in this situation in the first instance, and I should like to refer here to a class of case where they occur among the coils of the small intestine, and eventually find their way into the pelvis. I operated on a boy aged 10 just 12 hours after perforation of the appendix, and 48 hours after the first symptom of any abdominal trouble. The appendix lay in the pelvis, it was gangrenous and perforated. There was purulent fluid around it, and the adjacent coils of small intestine were lymph covered. I mopped out the fluid, and took great pains to have both gauze and tube drain carried well into the pelvis. Nevertheless, the probability of intestinal obstruction, or pelvic abscess occurring, was discussed and borne in mind,

Exactly one week after this operation, I was called upon to open the abdomen for acute obstruction, several coils of the ileum having become adherent in the pelvis. From this operation, he recovered as well as before, but, after eleven days had elapsed, I was again asked to see him. He complained of colicky pains in the abdomen, the temperature had gone up 100, and the pulse was 110. The median incision, though healed, looked a little red, and just beneath it a rounded tender mass could be felt, over which the intestine was seen contracting. Per rectum, the mass could not be reached. During the next four days, the abscess gradually extended towards the rectum, where it burst, with complete relief of all symptoms.

What I believe occurred in this, and similar cases, I have tried to represent in Fig. 5.

Fig. 5. *Showing the way in which an abscess among the coils of the intestine may extend down to the bottom of the recto-vesical pouch displacing the intestine.*

Pelvic abscesses, following appendix operations, usually occur at any time within the 18 days following the primary operation. In a series of 11 cases, the average period was just over 11 days, the shortest interval was 5 days, and the longest 18.

This series of 11 cases occurred out of a total number of 30 cases of pelvic appendicular abscess, operated upon by rectal, or vaginal, drainage ; but this is a comparatively small number if we bear in mind the total number of operations for acute appendicitis—probably 500—which have furnished the 11 examples of this complication.

As a rule there is no difficulty in determining the presence of

such an abscess, for the symptoms are as typical as in primary cases, but this is not always so. The temperature is not a very trustworthy guide, but if it keeps irregular, or, after a few days, commences to go steadily up, and there is nothing about the wound to explain it, then a pelvic abscess should at least be eliminated by careful examination.

In cases which subsequently develop these abscesses, the patients have often never been right after the appendix operation. One man could never sleep; another had a persistently dry tongue, and, in a third case, a boy, who was peevish, irritable, and bad tempered, became the very model of a good patient after the incision of such an abscess two weeks from the time of the first operation. Trouble with the bowels is often the forerunner. The patients have slight colic with much rumbling. Sometimes the original incision breaks down, and very commonly, it becomes angry looking and œdematous.

4. *The Cases with unusual Features.*—Occasionally, in cases of pelvic appendicitis, the symptoms and signs point more to an infection of the cellular tissues than to those of intra-peritoneal abscess. What the features are, which characterise a pelvic cellulitis due to the bacillus coli communis, I do not know. I am, however, familiar with a class of case, in which there is much local pelvic pain, but without marked bladder, or rectal, symptoms, in which the temperature is high, 102 or 103, and in which the rectum is surrounded with very hard exudate, without much tendency to abscess formation. The temperature comes slowly down, and the hard exudate more slowly disappears.

In one or two such cases that I have seen, a needle has been thrust into the exudate, without finding pus. All the cases have recovered, and in two, in which the appendix was subsequently removed, no light was thrown on the condition.

But nearly all the examples, which come under the head of those with unusual features, are more or less chronic cases, and a small pelvic abscess, at the bottom of the recto-vesical pouch, seems particularly prone to give rise to difficulties in diagnosis. When the cases are analysed, they mostly fall into two groups; those with rectal symptoms as the most prominent feature, and those in which the bladder is principally affected.

Mr. Gilbert Barling[7] records several cases where the

presence of a pelvic abscess was not at first recognised as the cause of the symptoms from which the patients suffered. In the case of a gentleman of 40, the principal symptoms were pain in the rectum, painful defæcation, and difficulty in emptying the rectum, with some bladder irritability. The bowel symptoms were so pronounced that the condition had been diagnosed as colitis, before Mr. Barling saw him; but they did not disappear until a pelvic appendicular abscess, containing 3 ozs. of pus, was opened and drained. In another case, which I had the opportunity of seeing, the symptoms were of a more chronic character, and a mass could be felt from the rectum which so strongly suggested a malignant growth in the sigmoid flexure, that the abdomen was opened under this supposition. The appendix lay in the pelvis, adherent to the posterior and right walls, and with the last 12 inches of the ileum inflamed and softened, closely bound around it.

If we again appeal to Mr. Barling's paper, we find an excellent example quoted of a medical gentleman, who suffered from a pelvic appendicular abscess. His illness began with most intense pain in the abdomen, shooting down into the testicle and penis, and causing faintness. This was supposed to be renal colic, and, when later, it was followed by frequent painful micturition, the stone was supposed to have reached the bladder, and the patient was sounded under an anæsthetic. As no stone was found. the troubles were thought to be possibly due to tubercle. A prolonged holiday caused improvement all round, but the irritability of the bladder returned, and it was only after a pelvic abscess had been drained that the symptoms were relieved.

In all these obscure cases, it is most important to go very carefully into the history, for, as a rule, the story of some acute attack can be elicited, and is a valuable guide.

In the conduct of the pelvic examination, there are a few important points which must be borne in mind. The rectum should be selected in both sexes, for by it the most information can be gained as to the condition of the recto-vesical, or recto-vaginal, pouches; but in women, whenever possible, it ought to be supplemented by vaginal examination. It is important to direct the patient to discriminate between any pain associated with the introduction of the finger, and that produced

by touching the parts inside. It is because the patient can give valuable help in this way that the examination is most useful when conducted without anæsthesia. Of course the rectum should be empty, but more especially the bladder. The finger can appreciate the presence of fæces, but very careful observers may be misled by a distended bladder, and it is most likely to be met with in just those cases where a pelvic abscess is suspected. Even when an abscess is present, its true proportions are masked by a full bladder. Further, the urine ought to be drawn off by catheter, for patients with pelvic peritonitis, even if they are able to micturate, may not be able to empty the bladder completely.

The value of bimanual examination *in both sexes*, cannot be overrated, for it is especially of service in those cases where an abscess, among the coils of intestine, is finding its way down to the pelvis, or where pus is creeping down the right pelvic wall from the iliac fossa. Without very careful local examination, it is important not to rely too much on the occurrence of pelvic symptoms. Retention of urine may occur in many acute abdominal diseases, and I have seen it with gall stone colic. Similarly urinary symptoms may occur in cases of non-pelvic appendicitis, as in that of a woman of 32, who had painful frequent micturition, but in whose case the appendix was found adherent in the subcæcal pouch.

Mr. Lockwood[8] puts the matter clearly, when he says that, in cases of appendicitis, pain, greatest towards the end of micturition, with tenderness on rectal examination, is evidence of inflammation of the pelvic peritoneum, but not conclusive evidence of the presence of the appendix in the pelvis. But the converse is entirely true, and I have seen two cases of well-developed abscess in the recto-vesical pouch, in which there was not a symptom to direct attention to that part; hence the need for routine pelvic examination.

INTESTINAL OBSTRUCTION AS A COMPLICATION, OR SEQUEL, OF PELVIC APPENDICITIS.

Obstruction in association with appendicitis may occur as set out in the following classification :—

1. Obstruction due to appendicitis, or its results—
   a. During an acute attack.

b. During convalescence, or after operation for acute appendicitis.

c. In the recurrent cases.

d. At some period remote from the acute attacks.

2. Obstruction produced by the appendix without appendicitis.

I have never seen a case of acute mechanical obstruction in the early stages of a pelvic appendicitis. In very many of the abscess cases, especially in those of large size, one of the prominent symptoms is a certain amount of intestinal obstruction, which is partly due to the inflammatory involvement of the intestine, which roofs over the abscess, and helps to form its wall, and partly to the actual pressure of the tense abscess on the rectum. There may be a great deal of distension ; the patients have rumbling colicky pains, and the exalted peristaltic movements can be plainly seen through the belly walls. There may be inability to void flatus, and some vomiting; but I have never seen a case which did not yield, for the time being, to a dose of castor oil, or a turpentine enema.

Cases coming under the second head (*b*) are not at all uncommon, and one of the best examples has recently come under my notice in a patient under the care of Mr. Rutherford Morison. This was a big powerful woman of 35, who was admitted to the infirmary exceedingly ill, with a large pelvic abscess extending up into either iliac fossa. The appendix was removed from above, and the abscess in that situation opened. At the same time, a large quantity of pus was evacuated through a vaginal incision. At first, the patient made a very good recovery. At the end of a fortnight, the vaginal drain was removed, and the incision in the abdominal wall was nearly sound. Just five weeks after operation, this patient suddenly developed acute intestinal obstruction, necessitating a prompt resort to laparotomy. The obstruction was found in the pelvis, where several coils of the small intestine were adherent, the last piece to be separated was fixed by its convexity to the very bottom of the pouch of Douglas, where there was a small collection of pus. This loop was so much torn that it had to be resected, an end-to-end anastomosis being made. The patient made a good recovery, and, a year after the operation, was in every way sound. Obstruction

occurring in such cases seems to be due to the shrinking of the abscess, which carries the intestine down to the bottom of the pelvis, where it becomes adherent and kinked as in Fig. 6. But the pelvis is a fruitful source of obstruction apart from abscess in it, by virtue of the readiness with which septic fluids are liable to find their way into it.

The pelvis is again the commonest seat of the obstruction, in cases coming under the fourth head (*d*), and the following example which I recorded in a previous paper [9] well shows the sequence of events.

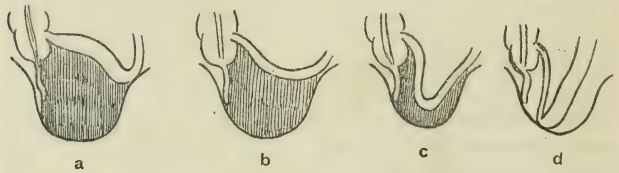

Fig. 6. *Showing the way in which intestinal obstruction is produced in cases of pelvic appendicular abscess. In* a *the lowest part of the ileum is shown forming part of the roof of the abscess, it is distended and obstructed to a certain extent by reason of its involvement in the inflammatory processs. In* b *and* c *the abscess is shrinking as it becomes emptied, and in this way the intestine reaches the bottom of the pelvis, where it may become adherent and kinked as in* d, *causing obstruction.*

A female, of 40, had an appendicular abscess opened, and drained in March, 1900. During convalescence, a purulent collection was opened, and drained per vaginam. She remained well until December, 1903, when she developed acute intestinal obstruction. Death occurred some days after enterostomy had been performed. At the necropsy, a large loop of small intestine was found strangulated under a band formed by adhesions in the pelvis at the site of the old abscess.

TREATMENT.

In the cases that come under the head of interval operations, the only difficulty is in reaching the appendix, when deeply fixed in the pelvis. When free from adhesions, it can readily be hooked up through any incision, but, in other circumstances

a proper exposure is of paramount importance. The oblique incision in the iliac fossa, parallel to the outer end of Poupart's ligament, gives an admirable exposure, and is very well suited for drainage, should it prove necessary. The incision, with displacement of the lower half of the right rectus, or through the middle line below the umbilicus, gives a very good exposure, but should it be necessary to drain it is inconvenient, for the drainage is uphill, and leaves a weak spot in an awkward part of the abdominal wall. In some cases, the Trendlenberg posture is of great assistance. In the case of pelvic abscess, the question comes to be one of abdominal versus pelvic drainage. The records of operations by the abdominal route themselves condemn the method, while those of the alternative route show it to be safe and satisfactory.

Mr. Rutherford Morison has recorded[10] the case of a lad of 18, who came to the Newcastle Infirmary in May, 1900, suffering from a pelvic appendicular abscess. This was opened, and drained through a median abdominal incision. The parts about the cæcum were so much adherent, that it was considered unwise to search for the appendix, yet a fæcal sinus developed, and an abscess reformed, and burst into the rectum during convalescence.

Even Mr. Edmund Owen, who wrote a paper on "The Treatment of Appendix Abscess in the Recto-Vesical Pouch,"[11] on purpose to vindicate the abdominal route, has to admit, "Though the peritoneum showed itself proof against infection by the bacilli coli, the surface wound became infected about a fortnight after the operation, and so severe was the attack of cellulitis caused thereby, that some large branch of an artery in the epigastric region burst out bleeding on two occasions, and the patient was near dying from secondary hæmorrhage." The *only thing* in favour of the abdominal route is the possibility of removing the appendix at the time the abscess is opened; but again both the hospital records, and published cases, show that this is often impracticable through a median incision. The search for an appendix, densely adherent in the pelvis, had much better be left, until it can be carried out as an interval operation. The most comprehensive records with which I am acquainted are those of Rotter, which I have culled from a review of his excellent paper.[12] In 132 operations for

appendicitis he had 41 pelvic abscesses to deal with, and he is able to record the results of 44 operations. Nine abscesses were opened by laparotomy, with 3 deaths; 9 by vaginal incision, with 1 death, viz., a patient who also had ileo-cæcal and subdiaphragmatic abscesses, which required subsequent operations. Eleven by a perineal incision, with 1 death; a case where the abscess was found to communicate with the peritoneum. Fifteen were opened per rectum; all recovered, though 8 were complicated by ileo-cæcal abscess, and 2 by abscess over left Poupart, which required subsequent operations. It has been urged that there is a danger of wounding the small intestine or the bladder, accidents which are supposed to lead to fistulæ. I have never seen the intestine injured, nor have I heard of it occurring, but it might, if an operator essayed to open an abscess in such a condition as is shown in Figs. *2 b* and 6. But this accident will not occur, if care is taken in the selection of cases, for only those are ready for rectal or vaginal incision, which definitely bulge into the bowel, as shown in Fig. *2 a*.

It is well to bear in mind that, if a pelvic abscess has once been opened per rectum, the small intestine will probably have been carried down to the bottom of the pelvis, and become adherent there. In these circumstances, should a second abscess form, the gut might not be able to find its way out of the road, and would be in danger of being wounded by a rectal incision. But such an abscess would probably not point into the rectum, but track up into the iliac fossa.

Some surgeons give no anæsthetic, but unless the abscess is actually on the point of bursting, I think it is better to do so. When once the patient is under the anæsthetic, the utmost gentleness must be observed, lest the abscess be unwittingly burst, possibly, into the general peritoneal cavity. The patient is placed in the lithotomy posture, with a pillow or sand-bag under the pelvis. The bladder is now carefully emptied by catheter, and those who are not very familiar with the operation, had better use a metal instrument, which can be left in the urethra as a guide. After cleansing the anus, it is a very good plan to pass one of the shortest of Kelly's rectal specula, which brings one at once to the bulging abscess. An exploring syringe demonstrates the presence of pus, and, with the sinus

forceps, the opening is enlarged. Drainage is best provided for, by a rubber tube half an inch in diameter, passed for about 2 inches into the cavity, and allowed to project about an inch beyond the anus to which it is fixed by a catgut suture. It is not necessary to irrigate the cavity. During the next few days, it is better to keep the head of the bed raised. The tube can usually be removed within a week, and most of the patients have been able to leave the hospital in from 12 to 14 days.

When the abscess is secondary to one in the right iliac fossa, the treatment varies a little. If the pelvic abscess is definitely bulging into the rectum, then it had better be opened there. This may suffice to drain the collection in the iliac fossa, and if this is so, the appendix can be removed at the end of a few weeks, or left pending further trouble. In those cases, where the pelvic abscess does not actually bulge into the rectum, and therefore could not be safely drained by that route, the operation must be performed from above. Drainage of the pelvis can usually be affected by a large rubber tube, carried well over the brim, and surrounded with gauze; the patient, during convalescence, being kept turned towards the affected side. In such cases, a sharp look-out must be kept for a residual abscess during convalescence. When an unsuspected collection of pus is found at the bottom of the pelvis, the abdomen having been opened in the right iliac region, the question of combined drainage arises. In females, I have very often seen this successfully carried out, an opening being made into the vagina.

THE QUESTION OF THE REMOVAL OF THE APPENDIX.

If the pelvic abscess is a stage in the recovery from a general septic peritonitis, then the patient ought not to be allowed to run the risk of the recurrence of so serious an illness, and the appendix should be removed before leaving hospital. This may be safely performed, two or three weeks after opening the abscess. If in any of the other cases a tender mass, or nodule, persists in the right iliac fossa or per rectum, then the appendix should be removed. In those cases, which make a complete recovery, after the abscess has been drained, the question of the removal of the appendix turns on the

liability of recurrence, and it has indeed been said that the risk [13] is greater in the pelvic cases. It is, I think, a very safe rule to advise a patient to come back for removal of the appendix, if there is the least return of his former trouble.

I am much indebted to those members of the surgical staff of the Royal Infirmary, in Newcastle-upon-Tyne, who have given me permission to use the records of their cases, and to Mr. W. G. Richardson, assistant surgeon to the Infirmary, who has kindly drawn the figures for me.

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THE TISSUE METABOLISM OF PHTHISIS PULMONALIS, ALBUMOSURIA, AND THE THORACIC INDICES OF PHTHISIS.

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My attention was first drawn to the subject of the tissue metabolism in cases of phthisis by a paper read by M. Robin, of Paris, at the last International Congress on Tuberculosis in London. In that paper he dealt with the tissue metabolism, from conclusions arrived at from his and M. Binet's analyses of the expired air, in cases suffering from phthisis pulmonalis. The results of their investigations, in 92 per cent. of their cases of phthisis, are published in the *Bulletin de l'Académie de Médecine, Paris, No. 3 Séance du 21 Janvier* 1902. It is found that the respiratory capacity is lower than the normal average of 3·3 litres, and also than the average normal stature respiratory capacity of 20 c.c. The pulmonary ventilation is increased over 80 per cent., carbonic acid over 64 per cent., total oxygen consumed over 70 per cent., and the oxygen absorbed by the tissues over 94 per cent.

Whether it is a case of acute phthisis, or chronic phthisis, whether the patient is in the initial or final stages of the illness, the respiratory exchanges are always augmented, though in varied proportions. In order to explain this increase of the gaseous exchanges, several hypotheses are possible, but the one which receives most support from experimental evidence is that the increase is a manifestation of the presence of the "soil" of tuberculosis.

A large number of the descendants of tubercular parents have been examined, and 60 per cent. of them already showed these exaggerated exchanges, although no actual trace of the disease could be found. It is not yet possible to say in how many cases, where the children of tubercular parents have shown this predisposition, phthisis pulmonalis has ultimately shown itself, because the cases have not yet been observed for a sufficient length of time, but up to the present two subjects, who showed increased respiratory exchanges, have since developed phthisis.

They have a number of observations on similar subjects,

who have either normal or lowered exchanges, and who have not yet shown any signs of tuberculosis. For example :—A girl in robust health, who is the only survivor of the family, has normal respiratory exchanges. Her father died from phthisis, and five other children died from tubercular meningitis. Again, a man who always enjoyed good health, now over 50 years old, has diminished exchanges. His father and mother were phthisical, and his two sisters and one brother died from phthisis. They have studied forty other morbid states to discover whether this exaggeration of the respiratory exchanges exists in other diseases, and although, in a certain number of them, the exchanges were increased, yet in each of them the respiratory analysis differed in some feature from that of a case of phthisis.

This increase of the respiratory exchanges may be developed by alcoholism, or by various forms of overwork.

The fact that this exaggeration of the respiratory exchanges in phthisis is almost constant, is of considerable value in making a diagnosis in case of doubt, but more important than this, is that it enables the "predisposition" to phthisis to be diagnosed. It naturally follows that, if the amount of oxygen consumed and the amount of carbon dioxide exhaled are increased, the tissue metabolism will also be increased, and there must be some constituent in the urine which, acting as an index of the tissue metabolism, will justify such a conclusion. For some time I sought in vain for such an index, until Prof. de Burgh Birch kindly suggested that possibly I should obtain a suitable index by estimating the purin bodies.

I am indebted to Dr. I. Walker Hall for the following information, which I have obtained from his valuable researches, published under the title of "The Purin Bodies of Food Stuffs."

The "purin bodies" are those substances which possess the nucleus C_5N_4, and those of ordinary occurrence in the urine are uric acid, with traces of hypozanthin, zanthin, and the methyl-zanthins. During the ordinary cell metabolism of the tissues of the body a certain amount of purins is formed and set free, which constitutes the "endogenous purins." "Exogenous purins" are those which are contained in the food taken into the body; they are exogenous purins to the system that absorbs them. But the endogenous purins are waste products on their way to excretion, so also the exogenous purins, being,

practically speaking, waste products, demand early and rapid elimination. Probably all purin bodies, occurring in the urine, are derivatives of substances containing alloxur or purin bodies.

Hopkins and Hope state that the immediate increase of uric acid after a meal cannot be due to the nucleins of the food, whereas Jerome maintains that such increase is directly due to the purin bodies contained in the food.

I. Walker Hall has shown that the usual meats contain much "free" and very little "bound" purin, and that, when "free" purins are ingested, they are rapidly oxidised and decomposed. About 50 or 60 per cent. of hypozanthin leaves the body as urinary purin (principally uric acid) within 4–6 hours after being taken, and the same percentage of uric acid appears in the urine after 8–10 hours, the remaining 50 per cent. of the food purin being excreted as urea, or as bodies intermediate between uric acid and urea.

The endogenous purins may undergo similar metabolism to the exogenous purins, and only 50 per cent. of the total purins appear as urinary purins. The endogenous purins are partly derived from leucocytes, but mostly from the cell changes, which result in the maintenance of the functions of the body, and it is possible that the endogenous urinary purins represent about one-half of the total endogenous purin produced, and that the latter quantity indicates the extent of metabolic processes more completely than any other factors at present available. The diet given in each of my cases being practically purin free, the purin bodies found in the urine are the endogenous purins.

A normal healthy man, weighing 70 kilog., partook of an almost purin free diet for a period of eight days ; an average of 0·1623 grm. total purin nitrogen was excreted, which equals 0·0023185 grm. per kilog. of the body weight. My weight is 55·675 kilog., and on a similar diet 0·13455 grm. total purin nitrogen was excreted, which equals 0·0024167 grm. per kilog. of the body weight. This shows an excess of 4·2 per cent. over the previous case, which may be accounted for by headache and vomiting from which I suffered during the experiment ; and, therefore, I have taken 0·0023185 grm. "total purin nitrogen" per kilog. of the body weight as the normal average excretion. Hence, I have taken the amount of the total purin nitrogen as an index of the tissue metabolism, and

compared it with the information derived from the analysis of the expired air. The estimation of the purins was done with a Hall's purinometer.

By the kind permission of Prof. E. F. Trevelyan and Dr. H. de Carle Woodcock, I examined their patients at the Consumption Sanatorium, Gateforth, but cannot in this short article give more than the average results of fifty analyses, which are as follows :—

—	—	Normal Average.	—
Respiratory capacity - - - litr.	1·675	3·300	Diminished 49·25 per cent.
Respiratory capacity per centimetre of stature - - - - cc.	10·32	20	Diminished 48·36 ,, ,,
Pulm. ventilation per kilog. of body weight per minute - - - cc.	144·1	107	Increased 34·58 ,, ,,
Carbon dioxide per kilog. minute - cc.	6·25	4·17	Increased 49·88 ,, ,,
Oxygen total consumed per kilog. minute - - - - cc.	7·49	5·13	Increased 46·00 ,, ,,
Oxygen absorbed by the tissues per kilog. minute - - - - cc.	1·24	0·96	Increased 29·16 ,, ,,
Total purin nitrogen - - grm.	0·17499	0·11117	Increased 57·4 ,, ,,

From the first two items it will be seen that the respiratory capacity is diminished, whether measured in bulk, or in relation to the stature of the individual; but this diminution was not apparently in proportion to the extent of the disease in the lungs.

Later it is shown that, in the majority of the patients, the antero-posterior diameter of the chest is greater proportionately to the breadth than is found in normal individuals. It is considered by Woods Hutchinson that this shows a want of development of the chest wall, and probably also of the lungs as well, in which case I submit that this is a factor in the diminution of the respiratory capacity. The possibility of this want of development being overcome, by performing proper breathing and other exercises during childhood, is one upon which I know of no evidence, but I am of opinion that those, who have large numbers of children under supervision in public institutions, should prosecute research work upon these lines. If their efforts proved successful, as I am inclined to think they would, a powerful means of stopping the spread of phthisis pulmonalis would have been discovered. In any case, the exercises would have been of real benefit to such a child.

The next four items in the foregoing table show the increase of the respiratory exchanges in phthisical patients, which, together with my other results, confirm the work of MM. Robin and Binet in every particular, and it may be taken that in phthisical patients the tissues of the body consume too much oxygen, and produce too much carbonic acid, that is, the metabolism of the tissues of the body is increased. As already stated, I examined the amount of the total purin nitrogen passed in the urine in 24 hours under the conditions previously stated. As shown above, the average amount was 0·17499 grm., whereas the average normal is 0·11117 grm., which shows that the total purin nitrogen was increased an average of 57·4 per cent. in my cases. As the total purin nitrogen indicates the extent of the metabolic processes more completely than any other factors at present available, the above increase points to the same conclusion as that derived from the study of the analyses of the expired air, that is, the metabolism of the tissues of the body is increased. Some of the patients were in the incipient stage of phthisis, others in the first, second, and third stages respectively. The result of the analysis did not seem to depend upon the extent of the disease, and yet there was a common condition present, viz., an exaggerated vitality, or autō-consumption, and not a lowered vitality, as has been taught hitherto.

As the descendants of phthisical patients have been examined, and 60 per cent. of those, in whom no actual trace of the disease could be found, had these exaggerated respiratory exchanges, we might conclude that the pretuberculous state consists in an exaggerated vitality, or auto-consumption. Therefore, I submit that the increased respiratory exchanges, accompanied as they are by the increase of the endogenous purins in the urine, indicate the increased metabolism of the tissues of the body, which enables the predisposition to phthisis pulmonalis to be detected, and the diagnosis of the disease to be confirmed, or refuted in doubtful cases. Being thus enabled to detect the predisposition to phthisis pulmonalis, all persons in whom it is present should carefully follow out the "open-air" treatment for consumption, and avoid, so far as possible, all sources of infection until an analysis shows that such predisposition has gone.

The chief complaint from our consumptive sanatoria is that

patients are not sent to them until the disease has progressed too far to effect a cure, and nothing is more disheartening to a physician than to receive such a case. The discovery of tubercle bacilli in the sputum fails us as a test of early phthisis, because their presence is itself a sign of disintegration of tissue. In our large towns such ulceration almost immediately becomes secondarily infected by pyogenic organisms, which undoubtedly lessens the chances of recovery. Moreover, I think everyone will agree that we should derive much better results from the injections of tuberculin, if these were given in the cases in which no secondary infection had taken place.

It is thus obvious that we should endeavour to detect the predisposition to phthisis, and to diagnose the incipient stages of the disease. Such cases admitted into our sanatoria would undoubtedly result in a cure, and our struggle against the disease would make greater progress than at present. In the January, 1905, number of THE PRACTITIONER, Dr. R. W. Philip published a paper on "Zomotherapy in Pulmonary Tuberculosis," and he, in conjunction with Dr. Galbraith, found amongst other facts that:—

"The exhibition of raw meat was followed by a marked *increase of nitrogen retention* provided the heat value and nitrogen of the diet exceeded the actual requirements of the individual per kilog. of body weight."

Owing to the tissue metabolism being increased in the manner that I have shown above, in those predisposed to, and also in those actually suffering from, the disease, it is obvious, from the results of the research work of Galbraith, how important a therapeutical agent raw meat must be in these cases, and probably its value is increased by the proteid-sparers added to a consumptive's diet.

I now pass on to the consideration of the occurrence o albumosuria in cases of phthisis. In the epitome of the *British Medical Journal*, 13th December, 1903, T. Neuman (*Norsk Mag. for Laegevidenskaben*, p. 1061, 1903), says Penzoldt was the first to show that bodily exertion, which was insufficient to produce a rise of temperature in healthy subjects, did produce a rise of temperature in tuberculous patients, and he considered such a rise to be of diagnostic importance. The investigations of Ott in regard to this point were made in order to observe if this rise of temperature was

associated with any distinct causes. He considered that such was the case, as he frequently found albumose in the urine of patients in which it had been absent before the commencement of work. He investigated 25 cases, of which 22 had a temperature of 38° C. before a quiet walk, but whose temperature rose to 38·8 C. immediately after. Neumann considers that the rise of temperature is a distinct febrile phenomenon, as he found albumose in six cases where it was absent before the walk was taken.

In each of my cases, I examined the urine passed by the patient on rising in the morning, and in the earlier cases also after a short walk. Afterwards, if I found albumose present before any exercise I did not examine again after exercise. I used Harris's test (*American Journal of Medical Sciences*, May, 1896), in which it is necessary to free the urine from all albumen, and also from the trace of an albuminoid body, which normal urine always contains (probably nucleo-albumen) before testing for albumose.

The test is as follows :—To 20 c.cm. of (acid) urine in a test tube add six to nine drops of a saturated solution of salicyl sulphonic acid in distilled water and one gram of pure lead chloride. Shake well, boil for half a minute, cool by running cold water over test tube, and filter till clear. Then add a few drops of a clear saturated solution of sodium sulphate in distilled water, in order to precipitate any lead held in solution, boil, and cool as before. Filter till clear, and divide into two parts. To one part add three to four drops of a saturated solution of salicyl sulphotungstate of sodium in distilled water. If albumose is present a cloudiness will appear, varying in degree with the amount of proteid present. As the amount of albumose is often very minute, it may be necessary to compare the tube with the control tube in order to detect the cloudiness. The cloudiness disappears entirely on gently heating the test tube, and reappears on cooling.

Harris concludes that albumoses are produced by the digestive action of microbes on the albumens of the body; these albumoses are produced in a larger quantity than the microbes require for their own growth and development; albumoses being readily diffusible, the excess in production is quickly absorbed by the blood, and being toxic is eliminated by the kidneys.

My results are as follows:—Albumosuria was absent in three early cases. It was present after exercise only in one case. In the remaining forty-six cases it was present before exercise.

I do not, therefore, agree with Ott and Neumann in thinking that albumosuria is indicative of a febrile condition, as the greater percentage of my cases were non-febrile.

I think it simply shows the presence of an infective condition in the body, and that, if it is absent in a case of phthisis, it is probable that there is no breaking down of the lung tissue, that is, that there is no ulceration of the lung tissue.

I will now draw your attention a little more closely to the thoracic indices in cases of phthisis, and refer you to an article by Woods Hutchinson in the *British Medical Journal* for 28th October 1899. The shape of the chest of a four months' embryo is almost exactly like that of a quadruped having a transverse index of 110. At birth the index is about 103; the index of the adult chest being 70·3. The average antero-posterior diameter of the adult normal chest is 7·6 inches, and the transverse diameter 10·8 inches. To find the "transverse index" let the transverse diameter equal 100, and find the value of the antero-posterior diameter thus $\frac{7{\cdot}6 \times 100}{10{\cdot}8} = 70{\cdot}3$ in the above case. The measurements are taken at the level of the nipple in the post-respiratory pause in natural breathing. The length of the chest was also measured from mid-clavicular point vertically downwards to lowest part of costal cartilages, no particular cartilage being sought for. The length being taken to represent 100, it is contrasted with the breadth and an index thus obtained, which is called the "longitudinal index." The average normal longitudinal index is 87·5. All measurements were made by chest calipers.

Woods Hutchinson found that in his American phthisical cases the transverse index was 79·3; in his English phthisical cases the transverse index was 79·6, and the average longitudinal index was 80·5 The results from the measurements of my 50 cases show that:—

10 per cent. had a transverse index under -	70·3
90 „ „ „ „ „ above -	70·3
The average transverse index being - -	79·5

Also that—

18 per cent. had a longitudinal index above 87·5
82 „ „ „ „ „ below 87·5
The average longitudinal index being - - 82·79

These figures show that the phthisical chest is deeper proportionately to the width than a normal chest, which is contrary to the opinion usually upheld, and that it is longer in proportion to the width than a normal chest. I do not think that this shape of the chest has been produced by phthisis itself, because—so far as could be ascertained—the majority of my cases had only suffered from the disease for a short period. Therefore, it is probable that this shape indicates a predisposition to phthisis, as it shows an arrest of the normal development.

I submit that, in cases of phthisis pulmonalis, and in those predisposed to it, the whole of the available evidence, of which the above is merely a brief summary, is unanimous upon the following points :—

(*a*) The respiratory capacity is diminished below the normal.

(*b*) The respiratory capacity per centimetre of stature of the individual is diminished.

(*c*) The amount of carbon dioxide exhaled per kilog. of the body weight per minute is increased above the normal.

(*d*) The total amount of oxygen consumed by the tissues of the body per kilog. of the body weight per minute is increased.

(*e*) The total purin nitrogen excreted is increased above the average normal amount, in a word, the tissue metabolism is increased.

(*f*) The presence of albumose in the urine is not indicative of a febrile condition, but simply shows the presence of an infective condition in the body, and that, if it is absent in a particular case, it is probable that there is no breaking down of the lung tissue, that is, that there is no ulceration of the lung tissue, and so the prognosis is much more favourable.

(*g*) The phthisical chest is deeper proportionately to the width, and is longer in proportion to the width, than a normal chest, and it is probable that this shape of the chest indicates a predisposition to phthisis, as it shows an arrest of the normal development.

SOME RECENT REPORTS CONCERNING ENDOTHELIOMATA AND PERITHELIOMATA.

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Of recent years a growing interest has been manifested in the behaviour of the endothelial cells lining the lymphatic spaces and clefts and the vascular channels of the body, and an increasing importance has been attached thereto. Pathologists are now teaching that in all probability the endothelial cell is the most important factor in repair, and that the numberless round cells which quickly collect, whenever reparative activity is needed, are not merely leucocytes, gathered in from the circulating blood or lymph, but are largely produced on the spot by an overgrowth of the endothelial elements in the neighbourhood. If, then, the irritation of some slight lesion suffices to determine proliferative activity of a useful type, it is not too much to suppose that increasing and prolonged irritation (or some acquired peculiarity of bodily habit) may light up an activity which may result in tumour formation. That tumours of such a type, known as the Endotheliomata, do exist has been recognised since their first description some fifty years or more ago, and successive observers have gradually added to our knowledge. The whole subject is wrapped in much obscurity and perplexity, as so many diverse types of growth appear to be developed. Thus those, which are derived from endothelial membranes, such as the pleura or peritoneum, appear to be quite distinct in type from those arising from the endothelial lining of lymphatic vessels ; whilst the peritheliomata may be looked on as a special subdivision derived from the outer cellular envelope which Eberth and Waldeyer demonstrated on the vessels of the pia mater and elsewhere by staining with nitrate of silver. It must be acknowledged, however, that the existence of this perithelium, as distinct from a perivascular lymphatic sheath, is not acknowledged by all histologists. Into the general details of the endothelial tumours it is impossible to enter ; they have been

exhaustively described by Rudolf Volkmann ("Ueber Endotheliale Geschwülste," *Deut. Zeitsch. f. Chir.*, Bd. XLI., 1895), and more lately by Max Borst (*Die Lehre von den Geschwülsten*, Wiesbaden, 1902). It is merely my desire in this paper to draw attention to some of the more recent notices of the subject, especially dealing with the clinical features of the disease. As already mentioned, the histological manifestations differ considerably, and it cannot be said that the clinical history is free from similar divergence of type. Any part of the body may be attacked by this affection, but the commonest sites of surgical interest appear to be the skin, testis, throat, parotid, and submaxillary glands, the neighbourhood of the mouth and cheeks, the long bones, and the so-called carotid gland. Cases involving all these structures have been the subject of recent comment.

Endotheliomata of the skin do not fall within my subjects for review, but one would draw attention to a paper by Coenen of Berlin (*Archiv für klin. Chirurgie*, 1905, Bd. 76, Heft 4), in which he endeavours to show that a number of cases so described by various authors do not merit such a title, but are merely forms of epithelioma. Certainly the illustrations which accompany his paper seem to bear out this contention.

Endothelioma of the Salivary Glands.—A number of papers were read at the meeting of the Pathological Society on April 29, 1902 (*vide Trans. Path. Soc. Lond.*, Vol. LIV., pp. 329–354). Various tumours were described, and their histology illustrated, but with one exception they all referred to the tumours of the salivary glands, cheek, lips, or palate. In all of these regions tumours of a complex nature occur, and their exact pathological entity has long been a matter of discussion. In particular the so-called *Parotid tumour* has been variously described. It has, up to recently, been looked on as a mixed tumour, containing glandular elements of an atypical character, and also cartilage, and a varying amount of mucous and fibrous tissue. It was supposed to start in the capsule of the gland, or in some of the outlying lobules, and the existence of cartilage was explained by a persistence of some elements of Meckel's cartilage from which the mandible is developed. The whole of this theory has been called in question of late,

and Raymond Johnson and W. P. Lawrence described at this meeting the histological appearances of 10 growths from the parotid and submaxillary glands taken from the University College Hospital Museum. Several of them were hard and apparently cartilaginous, but in all the authors believed themselves justified in terming the growths endotheliomata. The cartilaginous appearance is due to a hyaline degeneration of the cells and stroma of the growth—a very common change in endothelial tumours—and the physical consistence of these growths is quite in accord with this idea. Cartilage presents itself to the fingers as a firm mass, hard, and resistant; the nodules of a parotid tumour crumble down under the finger quite readily. In other parts the stroma is softer and more of a myxomatous type, whilst the true cell elements of the tumour are arranged in well-defined masses and columns, which spread out to form a regular network. In some of these columns a lumen is present, surrounded by one or more layers of cells, and it was on this appearance that histologists originally concluded in favour of an adenomatous nature. On careful examination, however, one finds that the layer of cells nearest the lumen is flattened, and outside this the cells have the usual spheroidal or polyhedral form. An important point is made of the relation of the cells to the surrounding stroma; sometimes it is definite and even, and the cells shrink away from the stroma during the hardening process; but more frequently nothing of this type happens, and the cells can be traced directly into the stroma with which they are continuous. The arrangement of the cell columns and strands, too, is suggestive of an embryonic vascular formation, but it is impossible to decide, at present, whether the growths, granting them to be endotheliomata, are derived from the endothelial cells of blood vessels or lymphatics. The great preference that these growths show for the neighbourhood of the salivary glands is not yet explained, although the association of a perithelial-like growth from the carotid body suggests to Johnson and Lawrence that possibly other, as yet undescribed, bodies of a similar character may exist in the carotid region, and from them these endotheliomata may be developed.

The clinical history of these parotid growths is so well known that it is unnecessary to allude to it here. The only

points needing to be emphasised are that removal should be undertaken as early as possible, since they sometimes develop a markedly malignant activity after a time, and that such removal should be thorough.

Endothelioma of the Testis.—The following is an interesting case of this nature, published by Dr. Edward J. Wood (*American Journ. of Med. Sci.*, October, 1905). The patient was a man, aged 43 years. In 1900 he came under observation for a painful nodule on the surface of the right testis ; the organ was increased in size, and the nodule was of firm consistency with no signs of breaking down. It was looked on as a sarcoma, and the organ was removed. Two years later, a similar occurrence involved the left testis, and the patient again submitted to castration. After this his general health improved, but he was never robust. In September, 1904, after a fall he began to complain of backache, of a dull boring character, though sometimes stabbing ; there were periods of entire freedom, but the pain was generally severe. There was no cachexia or wasting. In January, 1905, a fixed mass was detected in the left hypochondrium and loin, and was supposed to be a malignant affection of the kidney ; this proved correct on exploration, but the mass was too fixed to permit of its removal. The patient died ten days after operation of gangrene of the lung and hæmoptysis. *Post-mortem* examination demonstrated that the kidney was so fixed that it had to be removed piecemeal, whilst there was a nodule of growth on the liver, but apparently no secondary deposits elsewhere. *Microscopically*, the growth in the left kidney showed large areas of hyaline degeneration, which refused to stain with hæmatoxylin and eosin, and looking like degenerated fibrous tissue. Interspersed through it was a number of small round cells, staining deeply with hæmatoxylin, and closely resembling in appearance the constituent elements of a round-celled sarcoma. The greater part of the section, however, consisted of large polygonal cells packed tightly together, which possessed large nuclei, staining well, though the protoplasm of the cells stained badly. The arrangement and character of these cells were characteristic of an endothelioma. It is interesting to note that the author is emphatic in his declaration that the original growth was a large round-

celled sarcoma (though no careful description is given of it); but the recurrence was of an endotheliomatous type.

A somewhat similar case is reported by Sternberg (*Zeitschrift für Heilkunde*, April, 1905), and its exact pathological characters are very fully discussed. The clinical history is much like the former. The patient was a baker's assistant, aged 26 years. Ten years previously the right testicle had been inflamed, but the symptoms disappeared in four or five weeks, leaving, however, a hard knot behind. After a few years this began to increase in size, but remained painless, and in July, 1903, the patient submitted to castration. Subsequently he began to complain of pain in the back, want of appetite, and loss of power in the arms; the inguinal glands became swollen; definite pain was elicited on pressure over the second and third lumbar vertebræ; and bladder symptoms supervened. He was admitted to hospital in Vienna on August 1, 1903, and on the 7th an inguinal gland was removed for histological purposes. The patient went rapidly downhill, and, after manifesting definite pulmonary symptoms, died on September 12. The necropsy showed that the lungs were non-adherent, but studded with numberless knots of tumour formation, which were of a yellowish red, brownish red, or dark red colour; they were of a loose reticulated texture, and the lumina of large vessels could be frequently recognised therein. The glands in the posterior mediastinum were involved, as also the retroperitoneal. These latter were adherent to the lumbar vertebræ, but had not caused erosion; the inferior vena cava was surrounded by them, and its lumen narrowed by their pressure; on opening the vein, numerous branched processes of the growth could be seen projecting into it, and floating free in the blood stream. The liver was also studded with masses of the tumour.

The main interest of the case lay in the histological characters of the growth, which was found to be a perithelial sarcoma, or, as some would call it, a hæmatangio-endothelioma, but, in addition, cell elements were present similar to the protoplasmic masses found in a chorio-epithelioma. Lengthy details of the histological appearances are given, accompanied by illustrations to which one must refer readers who are interested in the matter. Very briefly, the growth consisted

of interlacing and communicating columns of cells, arranged in one, or at most two rows, around a capillary, which they enswathed like a cloak. These cells had large, usually round, sometimes oval, readily stained nuclei, whilst the cell protoplasm did not stain easily; in the nuclei typical mitoses were not uncommon. The capillaries were sometimes large and filled with blood, but every grade could be seen between these and a condition in which the cell processes were solid and non-vascular. Thus the tumour had an alveolar, almost gland-like, appearance in parts. Sometimes the new formations projected into the cavity of a larger vessel. In addition to these elements, however, another type of cell was not uncommon. It was found in the walls of the capillaries, and consisted of an irregular mass of protoplasm with a large spindle-shaped nucleus, staining deeply. Sometimes the capillaries were entirely surrounded by these, which not unfrequently united with similar cells to form a multi-nucleated mass. Occasionally, these actually projected into the lumen of the capillary, and might readily be swept away in the circulation. The connective tissue of the tumour was very full of cells, and here and there showed signs of mucous degeneration. The secondary deposits in liver, lungs, and lymphatic glands showed a similar state of affairs.

The growth was obviously a perithelial sarcoma, but the identity and origin of the large protoplasmic masses, with here and there clumped nuclei, were a little difficult to establish. Every gradation could be found between the endothelial cell and the big clumped mass, and it seems probable that these syncytial-like formations are to be looked on as derivations of the endothelium. Sternberg collects in his article all the cases of a similar type that he has been able to find in medical literature (fifteen in all) and discusses the opinions raised. Formerly the cases were described as giant-celled sarcomata. Schlagenhaufers (*Wiener klin. Wochenschrift*, 1902, p. 571) was the first to suggest the identity of these with chorio-epithelioma, and looked on the whole tumour as of teratomatous origin. Whether this latter proposition can be maintained is extremely doubtful; but the interest of these cases is great, showing a close similarity to the syncytial developments in the typical uterine chorio-epithelioma, and

indicating that possibly we may have to modify our opinions as to the nature of the latter affection.

The clinical characters of these testicular endotheliomata conform mainly to the sarcomatous type, and a critical survey of the literature of fourteen such cases led Dr. Krompecher (*Virchow's Archiv*, Band 101, reviewed in *Annals of Surgery*, July, 1899,) to the following conclusions:—

(1) Testicular tumours are much more frequently derived from non-epithelial than from epithelial tissues.

(2) Most of the non-epithelial tumours are derived from the endothelium of the lymphatics (endothelioma), fewer from the connective tissue (sarcoma). Krompecher notices the type of case reported by Sternberg, in which the growth is derived from the endothelium of the blood-vessels, and calls it an angio-sarcoma.

(3) Endotheliomata may arise in the larger or smaller lymphatics, but it is easier to detect the endothelial origin of the cells in the former than in the latter.

(4) Two types of growth may be distinguished. In one, the development is of a diffuse type, the cells not being arranged in any special manner, simulating the growths, which some French authors have described as "lymphadenomata," and probably identical with the so-called lymphosarcoma testis of some writers. In the second type, the endothelial cells are arranged in definite alveoli, and this is probably the most common type of malignant tumour of the testis.

(5) Sarcoma and endothelioma of the testis differ clinically from carcinoma in the following points:—(*a*) They generally occur in childhood, or before the age of 40; (*b*) they are generally of very rapid growth; (*c*) they have a smooth surface; (*d*) the tunica albuginea and skin are usually preserved; (*e*) the cord is generally unaffected; and (*f*) the primary seat of the growth is usually the epididymis.

(6) Some of the endotheliomata, arising from the large lymph spaces, are of remarkably slow growth.

Cervico-facial Perithelioma. — Vignard and Mouriquand (*Revue de Chirurgie*, Oct., 1905) report a case of this nature. A man, aged 60 years, was admitted to hospital with a vascular tumour of the left side of the face and neck, about the size of an orange. It had developed slowly, and was at first

thought to be a lipoma, but gradually its vascular nature became more and more apparent, and finally it gave rise to some hæmorrhages, which had almost exsanguinated the patient. Examination was impossible, as the least exposure led to severe bleeding. He was kept quiet, and ergot and salt solution administered; but finally intervention became necessary. A temporary ligature was placed round the common carotid, and the tumour, together with the submaxillary gland, excised. Considerable hæmorrhage followed, and the temporary ligature on the carotid had to be made permanent, whilst the wound was packed. Hemiplegia supervened, and the patient died comatose. The *post-mortem* examination demonstrated nothing abnormal.

On microscopical examination, the growth was found to consist of spaces filled with blood corpuscles and clot, surrounded by walls which had a hyaline structure, and showed no signs of endothelial nuclei. Between the spaces were collections of cells of an endothelial type, with nuclei sometimes round, sometimes elliptical, and with abundant chromatic filaments. The protoplasm of the cells became stained with eosin, and was sometimes freely granular; in shape they were elliptical, or more or less rectangular. They lay in contact with the capillary walls, or sometimes were separated from them by a series of intermediate cells, which were arranged more or less perpendicularly to them.

Vignard and Mouriquand add to their paper some considerations of the general history of peritheliomata, mainly derived from Max Borst's work already referred to. As to *nomenclature*, they appear in medical literature under the titles angiosarcoma, plexiform angiosarcoma, perithelial angiosarcoma, perivascular endothelioma, or even when degeneration of the vessel walls has occurred, myxoma, myxosarcoma or cylindroma.

In structure, peritheliomata consist mainly of capillaries, more or less dilated. Cell overgrowth occurs, but this chiefly outside the vessels so that these are enclosed in a sheath of cells, flat or polygonal, and an endothelial lining can be distinctly traced around the lumen of the vessels. Sometimes the perithelial cells are clumped together, side by side, without intervening connective tissue; sometimes traces of a fibro-

cellular stroma with spindle-shaped nuclei can be detected. Considerable modifications in these arrangements are visible in different cases, constituting plexiform, sarcomatous, and alveolar types. The vessel wall itself undergoes hyaline degeneration in not a few instances, and may lead to obliteration of the lumen, this change may extend into the connective tissue, and the result is that the tumour comes to look like a cylindroma of endotheliomatous type, and its perithelial origin may be demonstrated only with difficulty.

Peritheliomata are found most frequently in serous membranes, the parotid gland, bones, the cheeks and palate, the breasts, ovaries, &c., whilst by some the carotid body is supposed to be the site of a specially pure type.

Perithelioma (?) *of the Carotid Body.*—Amongst the tumours termed peritheliomata, an interesting place is held by those developed from the carotid body, which was first described by Haller more than a century ago. A full review of this subject appears in the *Revue de Chirurgie* (August and September, 1903), from the pens of Professor Redus and M. Chevassu, who reported a case and were able to find ten others in medical literature. The growths appeared after puberty and usually under 30 years of age—only thrice over that age. The development was slow, and hence operation was usually delayed. Sex seems to have no influence, and both sides of the body have been affected in almost an equal number of cases. Of course it is possible that other cases of this description have been operated on and their true characters not recognised.

The normal carotid body is 7 mm. in length, and lies within the carotid sheath immediately behind the bifurcation, its upper end just showing its nose ("montre son nez") between the two branches. The tumour corresponds in site, lying between the external and internal carotids, but projecting more on the deep side than superficially. Its size varies; the smallest tumours reported were 3½ cm. in vertical measurement, the largest 8. The colour in almost all was of a brownish tinge, somewhat like that of the thyroid body; the consistence was soft and elastic rather than hard. The growth in all the cases was clearly encapsuled, but the vessels lay in deep grooves, and were in not a few cases so buried in the mass that they had to be resected together with the tumour. In

only one of the 11 cases were the arterial walls much altered; in Paltauf's patient they were thinned almost to the point of transparency. The internal jugular vein was adherent in several cases, and needed to be resected in at least four instances. The nerves escaped more frequently, but the vagus required to be excised three times, the main cervical sympathetic twice, and the hypoglossal once. The tumour usually extends under the sternomastoid, and up to the angle of the jaw.

Histologically, the structure of these growths has not varied to any great extent in any of the 11 cases. There is a fibrous capsule, and a more or less abundant fibro-cellular stroma. The tumour itself consists in large cells, united into clumps or masses, separated from one another by vascular formations, so that under a low power an alveolar texture is simulated. These vessels are of the size and delicacy of capillaries, lined with a single layer of endothelium; but a curious feature is that a transverse section of such a vessel does not appear, or only very rarely. The sections all appear to be made in a longitudinal axis, and hence the cell masses are enclosed in a vascular capsule lined with endothelium of an ordinary type, and constituting an angiomatous development. The lumen of these vascular channels is not great, rarely exceeding that of a normal capillary; but occasionally the walls approach one another, and the lumen practically disappears, whilst more rarely dilatations occur. In Reclus' case there was but little evidence of blood in these channels. The cells contained in the alveoli exhibited an epithelioid type; they were packed closely together around the vascular channel, and were of large size, with a large nucleus, which stained readily. The number of cells in an alveolus varied considerably. This arrangement is typically that of a so-called perithelioma, and such, it is claimed, is the pathological nature of this growth. Reclus, however, expresses a doubt as to whether such a conclusion is justifiable in the light of the modern knowledge as to the character of the normal carotid body. Up to quite a recent date, two chief theories held the field, viz., (*a*) that the cell elements were independent of the vessels, and of a truly epithelial character, somewhat akin to the adrenal body; and (*b*) that the cells were derived directly by overgrowth

from the vessel walls. A discovery made by Stilling, and reported in 1892 (*Travaux de l'Univ. de Lausanne*, 1892), has put the question on a new footing. He found that the carotid body contained two types of cells—the epithelioid type mentioned above, and certain others which stain brown with salts of chromium ("chromaffines"). Kohn and others have confirmed these researches, which place the carotid body in a line with the sympathetic paraganglia which occur particularly in connection with the abdominal and pelvic sympathetic systems. The structure of a normal carotid body is practically identical with that of the tumour described above, and Reclus looks on the latter merely in the light of a hyperplasia of a normal texture, and hence considers it doubtful whether the term perithelioma is merited.

The evolution of these growths is slow ; in 8 out of the 11 cases, operation was not needed until more than 4 years after their apparent commencement. In 5 cases, however, the history given was that of a slow period of development at first, followed by one of increased rapidity. In 1 case only was there definite evidence of malignancy, and in that a lymphatic gland was invaded by the growth. In 1 case also recurrence took place, but inasmuch as in this instance the growth was separated from the vessels, and the external carotid alone excised, it seems possible that the relapse was due to incomplete removal. In one instance the growth was stated to be of a malignant aspect microscopically, but inasmuch as the patient died of the operation, this opinion cannot be considered of much value. On the other hand, 8 cases were apparently quite benign ; they were encapsuled, they grew slowly, and the only 3, whose later history is known, had no recurrence after 4 years.

The treatment hitherto recognised has been by operation, but this is not to be approached without considerable forethought, and a due recognition of its gravity. In only 2 cases has it been possible to remove the growth without damaging the vessels ; in 1 the growth was dissected out together with the external carotid, whilst in the remaining 8 cases the main trunk and its bifurcation into external and internal carotids had to be excised with the tumour, not to mention the veins and nerves as indicated above. It is only

surprising to hear that not more than 2 died as the result of such a proceeding, one of hæmorrhage, and a second of broncho-pneumonia after section of the vagus. Six patients were cured; but, as Reclus says, What cures! One case develops right hemiplegia on the 5th day, with aphasia, which at the end of 4 years has not completely disappeared. A second has a continuous irritation of his pharynx; a third, who suffered division of both vagus and sympathetic chain, retained a raucous, nasal voice, a difficulty in swallowing solids, and a continuous cough from tracheal irritation; he suffered from giddiness from time to time, the pupil was contracted, and the tongue deviated to the left. Other patients suffered in various degrees, but it is evident that the removal of the complete set of vessels and nerves in the neck, is a proceeding which should only be undertaken very cautiously, and possibly is unjustifiable even in malignant disease, and there is considerable evidence that a tumour of the carotid body is not of this nature. In Reclus' own case, it was possible to remove the tumour without damaging the vessels, but the patient subsequently manifested a paralysis of the lower half of the face, and also of that side of the tongue.

Endothelioma and Perithelioma of Bone.—William Travis Howard, Jr., and G. W. Crile are responsible for a contribution to this subject in the *Annals of Surgery*, September, 1905. They have made a collection of such cases from medical literature, and have gathered together, for analysis, 23 cases, including four of their own. Hildebrand first drew attention to the subject in 1891, and subsequently, in 1895, R. Volkmann reported and examined 14 cases.

It will suffice here to give a short *précis* of the clinical history of one of Dr. Crile's cases. The patient, a gentleman aged 65 years, came under observation for a spontaneous fracture of the left humerus. Two years previously he had fallen down a lift shaft without serious injury, but had subsequently complained of pain in the left humerus, much influenced by weather, but was able to drive a spirited horse. The arm broke spontaneously while tossing up a tennis ball preparatory to serving. It was treated in the usual way, but repair was slow. Some callus was observed at the end of the third week, but it subsequently disappeared. He had also a tumour of the

tip of the nose, red and vascular, looking somewhat like a rhinophyma; it pulsated distinctly, and, on examination of a small portion removed for that purpose, was pronounced to be a perithelioma. The fracture was believed to be due to a similar process in the humerus, and at the end of eight weeks distinct pulsation could be detected in the humerus. The arm was amputated, and the tumour from the end of the nose removed, but the patient developed some obscure pulmonary symptoms on the third day and died rather suddenly. No autopsy was permitted.

Endotheliomatous tumours of bone are closely akin to the sarcomata, but differ from them in certain clinical as well as pathological points. They may arise either from the medullary canal of long bones, or the spongy tissue of the shorter, constituting an endosteal tumour, or may develop beneath the periosteum; the endosteal origin appears to be the more common. They usually grow slowly to begin with, but may subsequently take on a more active type of development. When situated in a long bone, the first evidence of their presence, apart from some indefinite pain, is likely to be a spontaneous fracture. This slow growth is also evidenced by the possession of a capsule in a considerable proportion of cases—Kolaczek says in more than half of 78 cases of endothelioma which he collected and analysed. This capsule is derived from the surrounding tissues by condensation and new formation, and rapid increase in size is only likely to occur when this capsule has given way.

In 22 of the 23 cases alluded to above, the sex is given—12 males and 10 females. This indicates a rather greater proportion of females than occurs in osteosarcoma, in which affection men are more frequently affected by 17 per cent. In age, too, there is a distinction from sarcoma. Gross tabulated 147 cases of osteosarcoma, and found that 68 per cent. developed before the 30th year, and 85·7 per cent. before the 40th. In endothelioma, only 26·13 per cent. occur before the age of 40, whilst 73·87 per cent. occur after that age; of the 23 cases, only 5 were were present in patients under the age of 30. The distribution of the primary tumours shows that, as in sarcoma, the appendicular skeleton is more often affected than the axial. The sites of the primary tumours

were as follows: humerus, 5 times; femur, 4 times; tibia, 3; ulna, 1; iliac bones, 1; head, 3; vertebral column, 2; sternum and ribs, 1; other bones, 3. The appendicular bones were therefore involved in 14 cases, whilst the axial bones were implicated in only 6. As to the former of these, it is interesting to note that the upper extremity was involved in a much larger proportion of cases as compared with the lower than in sarcoma. Thus out of 165 cases of osteosarcoma analysed by Gross, 126 occurred in the lower extremity, whilst only 39 were located in the upper. With the 23 cases of osseous endotheliomata, the proportion of cases in the upper and lower extremities is as 6 to 8. They resemble the sarcomata, however, in their predilection for the articular ends of the bone where the vascular supply is greatest.

The naked eye appearances of the tumours varied considerably. In not a few the vascular element was very prominent, the growth having a spongy alveolar texture. In others it was of a more solid character, somewhat resembling the macroscopic appearance of a carcinoma. In other cases there were well-marked mucoid cysts, and still in others the whole growth had a mucoid consistence and look. From the histological standpoint, the tumours conformed generally to one of two types: (1) vascular tumours with alveoli filled with cells of differing characters; or (2) gland-like structures, the alveoli of which were lined with single, double, or multiple rows of round, oval, polygonal, or even columnar cells of the epithelial type. These two forms, alveolar or tubular, were not unfrequently conjoined in the same growth, but in both the intimate relationship of the tumour cells to the capillaries was very evident. The vascular spaces were few or numerous, large or small, and might contain much blood or little, and and hence the variability in texture of these tumours between solid, almost fibrous masses on the one hand, and growths so vascular on the other that they have been described as bone aneurisms. It seems probable that these latter are not unfrequently of an endotheliomatous nature. The fibrous stroma also varies in quantity, but seems to be of the ordinary connective tissue type. Various forms of degeneration of the tumour cells are reported, chiefly of a mucoid, hyaline, or colloid nature, thus simulating the degenerations which are so frequently observed in other endotheliomatous growths.

There has been much discussion as to the ultimate origin of these tumours, and as to whether or no they are to be regarded as peritheliomata. The whole question revolves around the doubt as to whether a true perithelium is present in connection with the blood vessels in bones; some observers claim that it is; others are equally insistent that it is not. Howard and Crile are to be classed amongst the latter, and regard these tumours as of an endotheliomatous nature, arising either from ordinary lymph spaces unconnected with blood vessels, or from the endothelium of the capillaries and perivascular lymph spaces. They regard the former of these as the origin of tumours, which resemble carcinoma both in macroscopical and microscopical appearances.

Dissemination of these tumours throughout the system occurs not unfrequently, and in the 23 cases under discussion it was noted in 63·64 per cent. Gross calculated its frequency in the osteosarcomata as not greater than 40·06 per cent. The distribution of the secondary growths accorded in the main with that of sarcoma, but the predilection for the osseous system is marked. In 14 cases in which metastasis occurred, the bones were affected 9 times, the lungs 4 times, the liver thrice, the lymphatic glands twice, and the spleen but once.

Diagnosis of endothelial growths of bone is impossible; beyond the facts that a growth is present, and that it is probably malignant in type, nothing more certain can be settled without examination of the tumour. Pulsation in a bony tumour has been claimed as a characteristic sign by Oehler; but, as Berger points out (*Revue de Chirur.*, January, 1900, "Sur les Endotheliomes des Os"), such a phenomenon merely indicates the existence of a vascular tumour—it may be a sarcoma, or one of those hæmorrhagic tumours, the nature of which is still somewhat doubtful, and known as bone aneurisms (*see* article by Gaylord, *Annals of Surgery*, June, 1903). The existence of a similar sign in the secondary, as well as in the primary, growths is suggestive, but not characteristic.

The treatment of bony endotheliomata follows naturally along the lines laid down for that of osteosarcoma.

CASE OF FIBROID TUMOUR OF THE VAGINA.

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THE vagina is much more rarely the seat of neoplasms than is the case with either the external organs below or the uterus above.

Different varieties, whether simple or malignant, are, however, occasionally met with. They may be a source of trouble to the patient, and give rise to mistake in diagnosis. From both points of view, the following case seems worthy of record :—

M. H., age 30, housekeeper, was admitted into hospital complaining of "a swelling in the privates." (It is of no small interest and importance, from the standpoint of differential diagnosis, to quote from the letter brought by the patient from her medical attendant. He says : "I am sending in a case, who came to me a week ago, saying she had piles. I examined and find prolapse of uterus with ulceration").

Nine months previous to admission to hospital, the patient had noticed a round swelling, red in colour and about the size of a large plum. There had been no symptoms until three months previously, and the patient discovered the swelling quite accidentally. The lump continued to grow steadily and rapidly, and pain was experienced on walking, or on turning in bed. For the last two years, the monthly periods had been very irregular, sometimes coming on every fortnight or three weeks. Before this, menstruation had been perfectly regular every four weeks. There was no history of amenorrhœa, or dysmenorrhœa, but there had been a constant yellow discharge from the swelling for three months previously to admission. Latterly, difficulty in micturition was experienced, but unaccompanied by pain. The bowels were moved regularly under the influence of aperients. On physical examination of the abdomen, inspection, palpation, percussion, and auscul-

tation revealed nothing of noteworthy importance. As regards the external pudenda, the labia majora were observed to be small. A globular swelling, as large as a cricket ball, was noticed emerging from the vaginal orifice, separating the labia minora, and bulging for a couple of inches beyond the vulva. It was greyish pink in colour, with a uniform surface, except for three bosses which projected from it. Two of them were about the size of a marble, and the other slightly smaller. The tumour, measuring $5\frac{1}{4}$ inches round the circumference, 2 inches longitudinally, $1\frac{3}{4}$ inches tranversely, was tense in consistence, and not tender on pressure. The projecting mass was covered by mucous membrane, which had become eroded at one point, leaving a round greyish area the size of a sixpence, and coated with a greenish yellow secretion. A quantity of this secretion was also seen at the margins of the tumour, and forming crusts on the labia and pubic hair.

On vaginal examination, the tumour was found to be attached by a broad base, and springing from the left wall of the vagina just within the ostium vaginæ, and growing distinctly outwards. The labia majora and minora could be well defined, and, on the left and upper side of the swelling, a reddish fold of mucous membrane was seen in the front of the left labium minus, which could be made out as part of the hymen. The tumour was free from all sides of the vagina except the left, and the examining finger could be passed into the vagina beyond it more easily above and to the right of the swelling. The uterus was small, and the os was that of a nulliparous woman, small and circular, looking downwards and backwards.

The bladder and bowels having been previously evacuated, the patient was anæsthetised and placed in the exaggerated lithotomy position. A large silver male catheter was introduced for the purpose of ascertaining the precise relation of the bladder to the tumour, and kept in position during the operation by the aid of an assistant. The mucous membrane covering the tumour was incised vertically and dissected off backwards, until access was obtained to the attachment of the tumour, which was discovered to be occupying the left lateral aspect of the vagina. There was not much hæmorrhage encountered, until the base came to be enucleated, when brisk bleeding

ensued, which was duly checked by forcipressure, the larger vessels being ligatured with catgut. The little oozing, which persisted, was quite controlled by stitching up the raw area with catgut. The catheter was then removed from the bladder, and the vaginal cavity douched with lysol. Iodoform gauze was introduced into the vagina, and continued as a dressing applied externally, and kept in position by means of a T-shape bandage. The patient made a good recovery, and left hospital four weeks from the date of admission.

On microscopic examination, the main mass of the tumour consisted of fibrous tissue, intermixed more or less with plain muscle fibres. In some places, the fibrous tissue predominated, in others, the muscle cells were more numerous. On the whole the two elements, fibrous and muscular, were fairly equally mixed, with perhaps a slight predominance of fibrous tissue. The nodules, or bosses, presented a different appearance from the rest of the tumour. They appeared to have grown through, or eroded, the vaginal mucous membrane; their projecting surfaces had become the seat of inflammatory reaction, probably the result of chronic irritation, and some of the tissue had necrosed to form a distinct membrane. Deeper down there was the accumulation of leucocytes, and, at the base of the nodule, the tumour had undergone distinct myxomatous degeneration. The surface distinction between the projecting tumour tissue and the vaginal mucous membrane was very clear, the mucous membrane stopped short, and very abruptly, while between it and the nodule was a distinct fossa, at the base of which was a good deal of inflammatory reaction, as evidenced by the number of leucocytes.

Prize Essay.

THE TREATMENT OF ACUTE INTUSSUSCEPTION.

By THOMAS GUTHRIE, M.A., M.B., B.C. (Cantab.), F.R.C.S. (Eng.).

It is interesting to note that up to the year 1875, just thirty years ago, but little seems to have been known of the condition with which we are so familiar today as acute intussusception. Previously to that date, there is in the records of St. Thomas Hospital, London, no mention of "any case which was either recognised during life, or discovered post-mortem, as an invagination of one portion of bowel into another" (Sargent). Again, while during the whole decade 1875 to 1885, only 18 cases of the disease were treated in that institution; the records of the single year, 1901, show a total of no less than 21. While a fuller knowledge of the condition, and of the need for prompt and active treatment, has resulted in so great an increase in the number of cases recognised, a striking change has also taken place in the methods employed in dealing with the disease, and in the success attending them. Of the first 21 cases of acute intussusception mentioned under that name in the St. Thomas Hospital records during the period 1875 to 1887, five (or less than 25 per cent.) recovered, and in one of these the diagnosis was doubtful; while of 21 cases treated in the year 1901, ten (or nearly 50 per cent.) were cured.

Much stress must be laid on the importance of the Time-element; there is no acute abdominal affection of which it is truer that, other things being equal, the earlier the treatment is begun, the greater is the likelihood of a successful issue. It is to a wider recognition of this fact, combined with improved operative methods, that is due the decrease in the mortality of the disease, for "when in an acute case days have been allowed to elapse, the prospect of success by operation is so slight that, so far as statistics at present indicate, it is better to leave the case 'to nature.'" (Treves.)

The foregoing quotation suggests a reference to the possibility of "spontaneous cure," or recovery without active

interference. In the first place it may perhaps be assumed, though absolute proof is wanting, that, in a small and early intussusception, resolution may take place, the intussusceptum becoming spontaneously retracted from the intussuscipiens; this, however, is so problematical that it could not influence the treatment in any given case. It may be said, therefore, that practically the only chance of recovery in a case left 'to nature,' rests in adhesion of the entering to the ensheathing layer at the neck, and separation and elimination of the gangrenous intussusceptum. It is stated that this occurs in about 42 per cent. of the cases, and that the death-rate, in those in whom it does occur, is over 40 per cent. (Treves.) A policy of *laisser faire* has therefore little to recommend it; since in at least 98 per cent. of these cases death will occur, due to general peritonitis, to toxæmia the result of fæcal obstruction, or to exhaustion.

Turning now to the methods of active treatment, which are open to us, the only one of any value, apart from cœliotomy, is reduction by means of retrograde distension, or inflation, with, or without, external manipulation; the latter alone is scarcely worthy of serious consideration. Authorities differ as to the best material to inject, Treves and Jacobson recommending air, Cheyne and Burghard fluid, preferably hot milk. Should the latter be employed, the patient being placed under an anæsthetic (Chloroform or A.C.E.) with the buttocks somewhat raised, an oiled rectal tube, or large catheter, is introduced, and this is connected, by means of an india-rubber tube, with a funnel. The buttocks are pressed tightly round the tube to prevent back-flow, and the fluid is run into the funnel, the latter being held about three feet above the level of the body. The fluid is injected slowly, the whole process taking about $\frac{1}{4}$ of an hour, and a hand meanwhile is kept on the abdomen so as to avoid over-distension, and to watch the retreat of the tumour towards the cæcum; its progress thither being aided by gentle manipulation. According to Mr. D'Arcy Power, the capacity of the colon of a child of five months is ten ounces, of a child of one year, one pint. For the employment of air, a Lund's insufflator attached to bellows is the most convenient, and the injection is made with the same precautions, care being taken to inject small successive quantities.

In a series of 44 cases of certain or probable intussusception recorded by Fitz, injection, or inflation, was followed by recovery in 33, and by death in 11; while Wiggin reports 23 failures out of a total of 39 cases similarly treated. From the St. Thomas Hospital records, Mr. Sargent collected 26 cases threated by enemata, inflation, or manipulation only, with a mortality of 50 per cent. He remarks, however, that, in several of the cases the diagnosis appears to have been doubtful. Barker, on the other hand, tried distension in 8 cases, in all of which it failed. (*Clin. Soc. Trans.*, Vol. XXXI.)

According to Mr. Jacobson, "in quite early cases reduction will generally be possible with comparatively little force, and may be brought about satisfactorily by injection or inflation." There are, however, several somewhat serious objections to the employment of this method. It is applicable only to quite early cases, and even in them is by no means always successful. Of 24 cases treated by inflation at the London Hospital, 6 died unoperated on, and the remaining 18 required operation (Eve). Further, when it fails, and laparotomy becomes, therefore, necessary, not only has valuable time been lost, but, owing to the shock caused by the inflation, the patient is less able to withstand a severe operation. The St. Thomas Hospital records show that of 10 unsuccessful cases of inflation, in which resort was had later to laparotomy, 8 died and 2 recovered. Again, as the condition of the intestine before operation is an unknown quantity, and as gangrene may be present comparatively soon after the onset of the symptoms, inflation, although practised on apparently early cases and with every precaution, may lead to rupture of the bowel. There is the additional serious objection that the reduction, although apparently complete, may be, and often is, only partial, the last inch or so remaining unreduced; and moreover, a new growth, which occasionally appears to be at the root of the trouble, is necessarily left untouched. Lastly, not only does distension somewhat prejudice further treatment, and at times lead to a false sense of security, but it is always, even in early cases, less efficient in securing reduction than is abdominal section; and it is besides, from the nature of the case, of no use in the enteric forms, which are about 22 per cent.

of the whole, nor probably in the ileo-colic (12 per cent.) so that in 34 per cent. it is practically certain to fail.

Passing now to the treatment by abdominal section, the serious effects of so grave an operation on a patient of tender years make it essential to bear in mind the necessity for speed in operating. An anæsthetic (either Chloroform or A.C.E.) having been administered, the urine drawn off, and the whole surface of the abdomen cleansed, an incision is made in the mid-line below the umbilicus. This position is usually the most convenient, and additional space may be obtained by enlarging upwards; when, however, the intussusception is small, and has certainly originated in the ileo-cœcal region, the incision may be made near to the right anterior superior iliac spine, and the muscles spanned, as for removal of the appendix. After the arrest of all bleeding, the peritoneum is opened, and two or three fingers inserted, by means of which the intussusception is felt for, and reduction attempted in situ. If successful, this should be continued until the last inch or so is reached, when the mass is hooked into the wound and carefully examined, while the remainder of the reduction is effected. Any loops of small intestines, which escape through the wound during this process, must be protected by means of cloths wrung out of warm normal saline solution. The reduction is effected by squeezing of the intussuscipiens, and not by traction on the entering layer. Should any splits or tears occur in the peritoneal coat, these must be carefully stitched up with fine silk. In those uncommon cases, in which intussusception is associated with a new growth, the bowel should be opened by a longitudinal incision, and the tumour removed. Supposing that reduction has been accomplished, and that the portion of the bowel involved is in good condition, the parts are returned to the abdominal cavity, and the wound is closed. The suturing should be done carefully, as these patients are usually suffering from improper feeding, and, therefore, considerable strain may be put upon the scar.

If the case is such that reduction has been attempted and found to be impossible, but gangrene is not present, it seems probable that what is known as Jessett's operation (*Surgical Diseases of Stomach and Intestines*, p. 140), holds out the

best chance of success. This procedure is based on the method of "spontaneous cure." The intussusception having been reduced so far as possible, a longitudinal incision is made in the intussuscipiens, or outer layer, and through this the invaginated part is drawn. The extreme base of the latter is then transfixed from side to side by two silk stitches, placed at right angles to one another, and the whole of the mass beyond the stitches is cut away, leaving a free channel in the bowel traversed by the two sutures. These are then cut in the centre where they cross one another, thus making four sutures, uniting the ends of the bowel from within. Other stitches are similarly inserted around the entire circumference, and all are tied. The united ends are then withdrawn within the interior of the bowel, and a continuous suture is inserted from the outside around each half separately of the line of junction; these sutures taking up the peritoneal and the outer layer of the muscular coats only. Finally, the longitudinal incision in what was formerly the ensheathing layer is closed, and the operation is terminated in the usual way. The points in favour of this method are that it is not difficult, and can be done fairly rapidly, and that advantage is taken of any adhesions that may have already formed at the neck of the intussusception. In its place, excision of the entire mass may be done, and union effected by means of end-to-end suture, Murphy's button or Mayo Robson's bobbin; or, on the other hand, the intussusception may be left untouched, and a short circuit brought about by means of lateral anastomosis. Should resection be necessary about the ileo-cœcal junction, the dissimilarity in the sizes of the parts may necessitate closure of the ends followed by lateral anastomosis. In many cases, however, the patient's condition is such that none of the above methods can be adopted, and resection must be followed by the insertion of Paul's tubes into both ends of the bowel; the artificial anus, thus established, being closed later. In a still worse case, an artificial anus may be formed without resection.

The onset of gangrene somewhat alters the conditions, since no reliance can be placed on sutures situated in close proximity to the gangrenous part, and the latter, if left in situ, will lead to peritonitis; neither of which considerations

necessarily applies when the intussusception is irreducible alone. When, therefore, gangrene has occurred, the ideal method is a very free excision well wide of the gangrenous part, followed by end-to-end union by means either of suture alone, or of suture aided by one of the mechanical devices. Should the patient's condition not permit of this, resection must be done and an artificial anus established, or, in a desperate case, the following method may be adopted: the intussusception is invaginated a little further, and a continuous suture inserted, uniting the entering and unsheathing layers at the newly-formed neck, where the tissues are healthy. This is followed by the establishment of an artificial anus above the point of suture, and it is hoped that the channel will be re-established by the separation and elimination of the intussusceptum.

As regards the after-treatment of cases submitted to operation, there is not very much to be said. Mr. McAdam Eccles (Brit. Med. Ass. meeting, 1901) pointed out that three varieties of post-operation temperature are observed: (1) normal, when all is going well; (2) low, the result of shock; and (3) high, due to the absorption of toxins, and a very grave indication. In fatal cases, the temperature sometimes runs up to a great height after operation from no very certain cause (Pitts). Every effort should be made to combat the shock, to which so many cases succumb within a few hours. A rectal injection of 2 ounces of milk at 105° F. may be given at the close of the operation. Subcutaneous injections of strychnine, or ether and brandy, may be of service, but, perhaps, the most effective measure is the infusion of warm normal saline solution (to which a small quantity of brandy may be added) into the subcutaneous cellular tissue of the front and sides of the abdomen. This should be allowed to run in gradually from a vessel suspended about three feet above the patient's bed, and connected with the hypodermic needle by means of a rubber tube. Milk, after the first two or three hours, should be given in small quantities (one or two teaspoonfuls at first) and at frequent intervals. The infant, if breast-fed, should not be suckled for the first 24 hours, but the mother's milk should be drawn off and given in a spoon. Small doses of morphia may be necessary to

obtain quietude, and have the advantage of arresting intestinal movement.

As to the results of the operative treatment of acute intussusception, it is clear that statistics will vary greatly according to the class of case with which they deal. Thus, of 66 cases treated at St. Thomas Hospital, in which primary laparotomy was performed and reduction at once effected, 30 recovered and 36 died (a recovery rate of 45·5 per cent.). While of 93 cases of all varieties, in which operation was performed, 58 died and 35 recovered (recovery rate 37·7 per cent.). "Of these 58 cases, 31 died of shock, and 9 of these showed peritonitis post-mortem; 7 died of obstruction, due either to incomplete reduction, or secondary obstruction from adhesions, &c.; and the remaining 11 died from other causes." (Sargent.) Again, Barker, in the year 1888, recorded 34 cases in which the bowel was reduced, with 12 recoveries, while of 39 irreducible cases only 1 recovered, and this was treated by resection and immediate union. Of 51 cases, reported by Braun, in which reduction was attempted and accomplished in 26, 40 died and 11 recovered. Ten cases in this series, in which resection was done, all died. Mr. D'Arcy Power (British Medical Association meeting, 1901) reported 65 cases treated at St. Bartholomew's Hospital and the Victoria Hospital for children, during 1891–1900. Of these, 42 died and 23 recovered. Excision was required in 15 cases; in 7 an artificial anus was formed, and all were fatal; while 1 case out of 5, in which resection was followed by union with Murphy's button, was successful.

The above figures indicate that while in the earlier cases, in which reduction is still possible, operative treatment is attended by a fair measure of success. In those instances, on the other hand, in which, owing to delay in treatment, irreducibility, or gangrene, has supervened, little hope of success is presented by laparotomy. According to Treves, in the operation cases about one half are impossible of reduction. Mr. Pitts, speaking at the British Medical Association meeting, 1901, said that "if gangrene were present, the case was hopeless." A few cases, however, of recovery after resection for gangrene have been recorded; and, unless the patient's condition is such as to prohibit any operative measures, a

trial should always be made of one of the methods mentioned above, though "it must be confessed that none of these . . . procedures has been attended with any encouraging success." (Treves.)

The foregoing considerations serve only to demonstrate the importance of active treatment at the earliest possible moment. Gibson (*Ann. of Surgery*, October, 1900) estimated that 94 per cent. of cases, treated within the first 24 hours, were reducible on abdominal section, whereas only 61 per cent. of those treated on the third day were reducible.

A short reference must here be made to a method of treatment advised by, among others, Messrs. Cheyne and Burghard, in which laparotomy is combined with distension by fluid, preferably warm milk. It is claimed for this method that reduction is more easily effected, and that there is less shock than with laparotomy alone, since the warm nutritive fluid is of value, and handling of the bowel is only necessary for dealing with the last portion. Further, Mr. Pitts points out that, if inflation is practised before the abdomen is opened, reduction having been so far effected, the incision may be made more directly over the terminal portion, where the main difficulty is anticipated. It is, however, somewhat difficult to believe that any distending force, which may be safely applied, can be more efficient than a careful use of the fingers. Nor is it clear that the combined method involves less shock than laparotomy alone, for it must be remembered that distension itself is not free from shock, and the time occupied by the whole procedure is considerably increased. Lastly, any benefit that may result from absorption of the fluid can be, at least, as well secured by an enema of moderate amount at the close of the operation.

In conclusion, it may be definitely stated that all the available evidence indicates that for every case of acute intussusception, apart from those advanced cases in which the shock of an operation would certainly be fatal, immediate abdominal section is the proper treatment. Should circumstances be unfavourable for operative measures, and the case be quite an early one, distension by means of fluid is worthy of a trial, but, under the best conditions, cannot at the present day be regarded as sound treatment.

FAMOUS HOSPITALS AND MEDICAL SCHOOLS.

GUY'S HOSPITAL—(*Continued*).

[With Plates IV. and V.]

THE great men, Addison, Bright, and Astley Cooper, who made the name of Guy's famous in the early days of the nineteenth century will be dealt with in separate articles. It is sufficient here to state that during the Victorian period the Medical School at Guy's possessed a large number of well-known teachers, though space forbids any detailed mention of them; for Babington, Owen Rees, Sir William Gull, Moxon, Hilton Fagge, Aston Key, Cock, and Hilton were all men of great knowledge and individuality of character, and, perhaps to a greater extent than their predecessors, laid down those traditions of independent thought and action that are, and always have been, the distinguishing feature of the training at Guy's. The great link between this generation and that famous one that has passed away remains in the presence on the Consulting Staff of Sir Samuel Wilks, the father of modern pathology in England, who, in his perennial vigour, can still remember many of those great teachers.

In 1850, from a large legacy left to the Hospital by Mr. William Hunt, the Governors commenced the erection of the building which now accommodates the Medical Wards. This work was finally completed in 1872, and is perhaps, though not architecturally beautiful, the most imposing block of buildings at the Hospital. The tall chimney, topped by a conical cap, or steeple, of cast iron, is a familiar landmark all over London, though few of the thousands who daily cross London Bridge on their way to and from the City know that it is Guy's Hospital.

From 1870 till nearly 1890 the Hospital remained practically unaltered, but during the last 15 years it has been the steady policy of the Governors to bring the Hospital and School into a condition suited to the requirements of modern

treatment and research, and the changes have been so great that those who revisit it after an absence of some years have difficulty in recognising their Alma Mater.

At the present time the Hospital and School buildings stand upon about seven acres of land, at a lower level than London Bridge, or the London Bridge railway stations. Divorced from its old connection with St. Thomas's Hospital by the removal of the latter, it stands alone in St. Thomas's Street, facing some of the old St. Thomas's buildings, which are still used as railway offices, and the old St. Thomas's chapel, which is now a Chapter House for the Cathedral Church of St. Saviour's, Southwark. The various blocks are arranged in a quadrangular manner around the central garden, or "park," which formerly contained the finest fig tree in South London, but now, in smokier times, can only boast some fine plane trees and lawns. Nevertheless, it still seems very remote from the roar and bustle of modern London, when one can sit by the old fountain in the centre beneath the trees, and listen to the countless sparrows in them.

On entering the Hospital from St. Thomas's Street, the original building, with its Georgian façade and windows, meets the eye. In the centre of the square stands the statue of the founder, and in the Chapel to the right is his tomb, surmounted by the memorial by Bacon. This has been reproduced in a well-known engraving by Bartolozzi, and is a fine work in both design and execution.

The Surgical Wards are arranged around two inner quadrangles connected by a colonnade, at the south end of which is a memorial recently erected to the memory of those Guy's men who fell in the South African war. Though the shell of the old building of 1721 remains, the interior has been entirely modernised, in accordance with present-day requirements, with electric lifts, glass mosaic floors, and steam radiators as well as fireplaces. The operating theatre of Sir Astley Cooper's time still stands, though it is more used for demonstrations than operations, for five new operating rooms have recently been built.

The east side of the Hospital ground is entirely occupied by the great block of Hunt's House, which contains the medical, ophthalmic, and obstetric wards, together with the

ward for paying patients. On the ground floor, at the southern end, is the Out-Patient Department, now becoming inadequate to the ever-increasing needs of the neighbourhood. The old Lunatic House, which was built in 1774, for the reception of forty lunatics, is now converted into two Clinical Wards for the reception of cases of extreme interest or urgency, and the cases so admitted form the subject of the clinical lectures given throughout the year. In addition to being a completely equipped general Hospital, Guy's has a very large and efficient Dental Department. In 1892, a new Dental School having been started by the Staff, realising the increasing necessity for dental treatment on hospital lines, the Governors built a Dental Department. This consists of a large Conservation Room, accommodating about fifty dental chairs, together with all the necessary laboratories and demonstration and waiting rooms. This department, which is peculiar to Guy's among the metropolitan Schools, affords very exceptional facilities to students taking the L.D.S. diploma, as the entire curriculum can be followed at one institution. In addition, beds are set apart in the Hospital for the reception of patients suffering from diseases of the jaws, such cases being supervised by one of the dental surgeons. The Dental School has been exceedingly successful during its short career, and now takes a very high position among the important Dental Schools of the kingdom. In 1904, 17,204 patients were treated in this department.

In 1889, a Residential College for Students was built by the School and opened by the Right Hon. W. E. Gladstone. This building stands outside the main Hospital ground, affords accommodation for about 60 students, including the resident Medical Staff, and also houses the Student's Club. In the quadrangle of the College, there is an excellent gymnasium, the gift of Dr. F. W. Pavy.

The increase in the work and efficiency of the Hospital has necessitated a great increase in the nursing staff. Consequently in 1901, a new Nursing Home was opened by H.R.H. the Prince of Wales. This Home had its origin in the munificence of the late Mr. H. L. Raphael, a Governor of the Hospital, and is named after his wife, the Henriette Raphael Nursing Home. It contains sleeping

Fig. 1. *The Medical Buildings.* (*Hunt's House.*)

Fig. 2. *The Henriette Raphael Nurses' Home.*

Fig. 3. *The Old Museum.* (*Recently pulled down.*)

Fig. 4. *A Corner of the Gordon Museum.*

accommodation for 230 nurses, each having a separate bedroom, and also large sitting rooms, dining hall, and kitchens.

In the basement of the house there is a large swimming bath, primarily for the use of the nurses, but which, by the permission of the Governors, is reserved for the use of the students on certain days in the week.

In addition to having the most complete accommodation of any hospital in London for nurses and students, Guy's is also entirely self-supporting in the matter of heat, lighting, and washing. The central station for the supply of heat, light, water, and power renders the hospital independent of outside supplies in these respects, and is a very considerable saving in the annual expense. The central station plant consists of four Lancashire boilers, four mechanical stokers, refuse destructors, an air compressor for pumping water out of the artesian well, nine other pumps of various sorts, and 3 dynamos and 50 accumulators. This complete apparatus enables electric light to be produced at a cost of about $1\frac{1}{4}d.$ a unit, pumps about 70,000 gallons of water a day, and affords the steam and power for the laundry, which washes about 40,000 articles a week.

This month sees the demolition of the Old Medical School buildings of 1826, and in their place the Medical School has, during the last 15 years, built the most ample accommodation in accordance with the requirements of the present day. The Chemical and Physical Laboratories, which were built in 1892, are in a building adjoining the Dental School, and an extensive Biological Department has been recently opened in Hunt's House.

The dissecting room, built in 1850, can accommodate upwards of 200 students at one time. This, together with the necessary injecting and demonstration rooms and storage tanks, occupies the most southerly portion of the hospital site, being entirely isolated from all other buildings.

The remainder of the School buildings are in one large block on the south-western portion of the site. The Physiological laboratories, chemical and practical, together with lecturers' and demonstrators' rooms, occupy three floors, and there is, in addition, a theatre which seats upwards of 400 people.

The Library, the gift of Sir Frederick Wills, Bart., was

opened in 1903. It occupies the ground floor, and is fitted throughout with carved oak panelling and bookshelves. The bookshelves are arranged in bays, one to each window, and afford accommodation for 20,000 volumes.

The Pathological Museum, which has always been a famous collection, was commenced by N. Davie, "a very zealous and intelligent young man," as Dr. Thomas Hodgkin styles him, who, while Demonstrator of Morbid Anatomy in 1802, made a small private museum, which was afterwards purchased by the Treasurer. Sir Astley Cooper also contributed largely to the collection. On the separation of the Schools of St. Thomas's and Guy's, in 1826, Dr. Thomas Hodgkin was made the first Curator of the new Museum. From that time to the present, the Museum has steadily been growing, and, in addition to specimens of purely pathological interest, it includes the famous collection of wax models of diseases of the skin modelled by Mr. Joseph Towne, and the equally famous anatomical models made from dissections by Mr. John Hilton.

The specimens now number 12,000, but for many years the accommodation for their proper exhibition has been quite inadequate. However, by the munificence of Mr. Robert Gordon, one of the Governors of the Hospital, a new Museum of Pathology, called after him the Gordon Museum, was opened last July. The building, which in point of size and convenience is second only to the Museum of the Royal College of Surgeons, is built from the plans of Mr. Woodd, the Hospital architect. It is arranged in four bays, intercommunicating and top-lighted, and each bay contains about 1,000 superficial feet of floor space for the exhibition of models and specimens on tables. Around each bay run two tiers of galleries, approached by a central staircase, thus giving a total wall space of rather more than 13,500 superficial feet.

This building now houses the collection of pathological specimens as well as all Towne's models of dissections and diseases of the skin, and in addition a collection illustrating the various diseases and affections of the teeth. In close connection with the Museum are the Curator's and other rooms, together with another Lecture Theatre, capable of seating about 200 people.

Such is a brief account of the Hospital and Medical School founded "at the sole costs and charges of Thomas Guy, Esquire," and though much has been done, much remains yet to be done. As in all other metropolitan medical schools, the expense of medical education and the demands of the curricula are yearly increasing without any increase of the income obtained in fees. It is sincerely to be hoped that, in the near future, the public will realise that medical education must be endowed and assisted in the same manner as other branches of education, and that by so doing a much greater benefit will be conferred upon humanity than by insisting that their charity shall only be devoted to the relief of the sick and suffering poor of the immediate present. As the present generation is being benefited by the generosity of benefactors such as Thomas Guy, so it owes an equal munificence to the generations yet to come. This is not a matter for one individual hospital or school as against any other hospital or school, but the crying need of all medical education in London at the present day.

Notes by the Way.

The Evolution of a Health Conscience.

Dr. Clouston pleads powerfully in the *Spectator* for the fostering of a health conscience in the community. He recognises that the evolution of the moral sense in this new direction has already begun. "A deep feeling of duty," he says, "is arising in regard to health. A conviction of health sin is growing, and a yearning for health righteousness is setting in. We all know that most things only get well done when a sense of duty comes in. Conscience is the great monitor against neglected duty. A health conscience is being created, which, if it strengthens, will certainly do great things for humanity." He adds, "The city degeneracy problem, the house problem, the nurture of children problem, the heredity problem, and the marriage of the unfit problem, shall be regarded as moral questions for the solution of which a deep responsibility is laid on each of us." All this is true, but human nature being what it is, it is not likely that altruism will become a general law of human action. Nevertheless, the awakening of the public conscience in regard to such matters will not be hindered by recognition of the fact that in this, as in other directions, the evolution of the moral sense makes directly for the personal good of each one among us as well as for that of the community. It is the interest of the dwellers in the palace that fever should be stamped out in the cottage. When we try to strangle tuberculosis in its cradle in the slums, our humanitarian zeal is apt to be quickened by the knowledge that it is there the monster grows which levies such a terrible tribute of lives among the well-to-do. If people can be got to realise that the performance of their sanitary duty to their neighbours and to the public is the surest safeguard to themselves, the evolution of the health conscience will be hastened.

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The Press and the Gospel of Health.

Dr. Clouston thinks that the Press must be the chief pulpit for the propagation of the new gospel of health. The Press can doubtless help by preaching the great truths of hygiene in language understanded of the people, but, if it is to do good, it must select its preachers with better judgment than it often does at present. As things now are, the Press, as a whole, does more harm than good. With a very few honourable exceptions, our newspapers care nothing for the diffusion of sound knowledge in regard to health ; they look upon medical science simply as a source of sensational articles, in which everything is either false or misleading. Their readers are led to pin their faith on remedies whose vaunted virtues are either imaginary or untested. From the pulpit of the cheap Press the people are taught to expect physical salvation, not from means of prevention, or treatment founded on established scientific work, but on "discoveries" which fade like unsubstantial visions at the touch of light, or on "systems" of diet, exercise, vibration, or what not, which have their day and cease to be. Indeed, the thing that is perhaps most urgently wanted is the development of a health conscience in the Press.

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The Newest Cure for Consumption.

Some reformers propose to cure all social ills by the simple plan of making sufferers from incurable diseases incapable of propagating their kind. The remedy is to be applied not only to lunatics returned to society as "recovered," and to epileptics, idiots, imbeciles, cretins, and weak-minded persons under restraint, but to sufferers from leprosy, cancer, venereal disease, and advanced organic disease of the heart, lungs, or kidneys. Castration in such cases is suggested, not for the benefit of the sufferer, but of society. But the operation has been practised as a cure for various diseases. We do not speak of cases like that of Origen, who mutilated himself by way of radically curing the weakness of the flesh ; his example has been followed by certain religious sects in Russia and elsewhere, but this heroic measure belongs to the spiritual, not to the surgical, domain. It is not so long ago, however, since castration was put forward by some surgeons as

the ideal method of dealing with enlargement of the prostate. Little is heard now of the method, which has been superseded by others less repugnant to the "average sensual man." Quite lately castration has been proposed as a cure for consumption. At the Tuberculosis Congress held in Paris last October, Dr. F. de Backer said that the only cure for consumption is fattening up the patient. Every method of fattening, according to him, should be based on the principle of gaining as much as possible without losing anything. We gather that it is to the cattle breeder, rather than to the doctor, that we should apply in order to learn how to fatten consumptives. Dr. de Backer describes how fowls are fattened for the market. They are shut up so that they cannot move, and are often deprived of light; they are fed to excess, and they are gelded. The three features in the system are, therefore, absolute rest for lungs and muscles, overfeeding, and "compulsory chastity." Clearly, however, it is not so much in the compulsory chastity as in the removal of the testicles that the virtue of the plan resides, for, as Dr. de Backer himself points out, "the eunuch is more easily fattened than the complete man, the ox more than the bull, the capon than the cock." If this cure establishes itself in professional favour, a new and highly promising territory will be opened to the enterprise of the surgeon. Consumption is one of the few spots on the map of disease that surgery in its march of conquest has left to medicine. Is that too to be taken from it by the ruthless invader?

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The Sterilisation of Degenerates.

In connection with the proposed method of eliminating disease, mental and bodily, to which reference has been made, we may mention for the behoof of those of our readers who may be interested in the matter, that a good deal about it will be found in the *Transactions* of the Medico-Legal Society for the year 1904–1905, lately issued. Dr. R. R. Rentoul of Liverpool, opened a discussion on the subject in which he expressed the opinion that degenerates who wished to marry should be sterilised after a written direction by the Commissioner in Lunacy. In the case of the sane, the operation should be voluntary; for them vasectomy would be sufficient. In the

case of the insane the operation of "spermectomy" should be compulsory. Sir William Collins asked what the state of society would be with numbers of sterilised criminal eunuchs roaming at large. He also objected to the proposed operation as unsurgical. He had little confidence in the short cuts of benevolent despots, and should hold up his hand against compulsory mutilation. Any remedy suggested must, he urged, be scientifically sound, legislatively possible, and administratively practicable. Dr. James Scott said that, after a quarter of a century's experience, he agreed that there were many degenerates. To deal with them as suggested would, however, raise insuperable obstacles. Certificates as to the need of sexual mutilation of the unfit would add another burden to the lives of medical men. Dr. T. B. Hyslop said that Dr. Rentoul's suggestion would be an additional attraction to prolific aliens. Dr. F. J. Smith said that until the public conscience was aroused he would restrict sterilisation to homicide culprits. He seemed, however, to be doubtful how far such schemes were practicable. Mr. Arnold White stated that he had recommended the sterilisation of the unfit nearly two decades ago. The meeting did not seem to know what a "degenerate" was, and Mr. Bernard Shaw, who undertook to enlighten the darkness of the medical mind, only succeeded in exposing the frothy confusion of his own. The most practical contribution to the debate was that of Sir William Collins, who spoke like a statesman. He referred to the effect that would be produced on society by "sterilised criminal eunuchs." But what about the "sterilised female degenerates"? It needs no great power of imagination to foresee that, to put the matter plainly, they would become instruments of lust that would be largely sought after on account of their disability. Readers of *Fécondité* will remember the appalling picture drawn by Zola of the depravity fostered by the unscrupulousness of certain venal surgeons. The case would be infinitely worse, if Dr. Rentoul's proposal—which we heartily agree with Sir William Collins in considering neither scientifically sound, legislatively possible, nor administratively practicable—were ever, in one of the transports of political frenzy to which a hysterical public is occasionally subject, put into execution.

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When is a Doctor not a Doctor?

APPARENTLY, if we are to believe a professional oracle, when he is a Doctor of Medicine. In referring to Dr. Rentoul we have been using the learned prefix, to which we thought he was entitled. We are not sure, however, that we do not owe him an apology for giving him a style and title which, we gather from a letter addressed by him not long ago to the *Westminster Gazette*, he would regard as injurious. He there informs the public that "the better-class medical practitioners are truly hurt when addressed as 'Doctor.'" We cannot say that we have ourselves observed this particular kind of hyperæsthesia among practitioners who hold the degree of Doctor of Medicine; we presume, however, that "Medical Practitioner" Rentoul (we really do not know what else to call him) speaks from knowledge, for he seems to have taken an amount of trouble worthy of a better cause in collecting information on the vexed question of the title of "Doctor." Some years ago he wrote to the Heralds' Office to ask if there existed any such title as that of Doctor. We are told there is no such title recognised. We do not know if the title is recognised by the Heralds' College, but "Medical Practitioner" Rentoul may easily assure himself that it is recognised by the Sovereign, who is the fount of honour. He has only to glance at a list of those present at the next levee to see "Doctors" grouped by themselves; their title gives them precedence over the plain "Messieurs." "Medical Practitioner" Rentoul is quite wrong in his statement that "the true meaning is that a person is given the "right or the title' to act in such and such and such a way." To take his own instance: he tells us that a person wishing to take up the profession of pedlar pays a fixed sum yearly, and the police give him a certificate which carries the 'right or title' to act as a pedlar. The person can, therefore, use the "title" of "Pedlar Jones." Certainly he can. But what "Medical Practitioner" Rentoul fails to perceive is, that if the said Pedlar Jones happened to be the possessor of the degree of Doctor in any faculty of a university recognised in this country, he could also use the "title" of "Doctor" without troubling the police for a certificate. The "title" of Doctor

of Medicine can be granted only by a university, and does not need to be recognised by the Heralds' College. It is the degree, and not the professional rights conferred thereby, that gives its holder definite precedence at Court. It is the misapplication of the title which causes confusion in the public mind, and also, we venture to guess, the somewhat inarticulate wrath in some celestial breasts that finds vent in letters to the papers more curious than convincing.

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Mark Twain's Rules of Health.

Our newspapers, which are so eager to supply details as to the mode of life of anyone who exceeds the ordinary limit of life, seem to have missed Mark Twain's account of the rules of health which have enabled him to complete his seventieth year on November 30. The occasion was duly celebrated with the solemn absorption of food which with the Anglo-Saxon people has taken the place of religious ritual. In responding to the toast of his health, the famous humourist revealed to his hearers the secret of his longevity. "Since forty," he said, "I have been regular about going to bed and getting up—and that is one of the main things. I have made it a rule to go to bed when there was not anyone left to sit up with; and I have made it a rule to get up when I had to." He went on to say: "In the matter of diet—which is another main thing—I have been persistently strict in sticking to the things which didn't agree with me, until one or the other got the best of it. Until lately I got the best of it myself, but last spring I stopped frolicking with mince-pie after midnight. In regard to smoking, Mark Twain said: "I have made it a rule never to smoke more than one cigar at a time. . . . . As an example to others, and not that I care for moderation myself, it has always been my rule never to smoke when asleep, and never to refrain when awake." He adds: "It is a good rule—I mean for me; but some of you know quite well that it wouldn't answer for anybody that's trying to get to be seventy." As for drinking, he said he had no rule about that. "When the others drink I like to help; otherwise I remain dry by habit and preference." Mark Twain added much more in the same vein

as to exercise, drug-taking, and other things, summing up with the following aphorism: "If you find you can't make seventy by any but an uncomfortable road, don't you go." *Ridentem dicere verum quid vetat?* We live, or try to live, too much by fixed rules, which at best represent nothing more than certain conclusions based on averages. Rules of life deduced from these are of little use to the individual. His mode of living must be adapted to his own particular case. Mark Twain gives us the true philosophy of the matter in two sentences: "I desire now to repeat and emphasize that maxim—We can't all reach age by another man's road. My habits protect my life, but they would assassinate you."

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Answers to Questions.

In our January number we published the best answer received to the question set for competition. We have found, however, that there are objections to this course which make its continuance undesirable and, indeed, impossible. We propose, therefore, in future to give only what may be called the official solution of the clinical or pathological problem submitted each month for commentary. We feel that this is likely to be more interesting as well as instructive to practitioners, than answers to questions which for the most part can be found in the text-books.

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Competitions.

The result of the December Competitions is as follows:—The best essay was sent by Dr. Vivian Chastel De Boinville, of Liverpool; and the best answers to questions by Dr. J. E. Bullock, of Notting Hill, London. Cheques have accordingly been sent to these gentlemen.

NOTES FROM FOREIGN JOURNALS.

TREATMENT OF MIGRAINE.

M Carron de la Carrière describes in the *Presse Médicale* (No. 57) his method of using cannabis indica in this affection, first recommended by Stephen Mackenzie in 1892. He gives the drug in pills, containing gr. $\frac{1}{4}$ of the alcoholic extract, one pill being taken every night at bedtime for thirty days consecutively. If sufficient relief has been obtained, this dose is continued, but if not, a double dose is taken for a fortnight, and then for the following fortnight one pill is again taken. This alternation is kept up for some time. If the migraine still proves refractory, two pills are taken at night, and one in the morning.

The treatment is continued systematically for a year; afterwards, for a month at a time, with increasing intervals. The patient should never give up the drug altogether, but take it periodically; more often in winter, and at such times when he knows by former experience that he is more liable to attacks. De la Carrière has not met with any case of intolerance for the drug, and he finds that tolerance is not established for those who, having taken the drug for years, find the small dose taken at first to be quite efficacious. As a help to this treatment, he recommends the daily use of the hot douche, beginning at 38°–40° C., and going up in one or two minutes to 43°–45° C. The jet brisé should be used. The head and neck are not to be touched, and the hot douche should finish with a full jet on the feet. A vigorous cold jet completes the process.

In severe paroxysms, the hot douche has a good sedative effect, and in addition rest in bed in semi-darkness should be adopted. Frequent applications of the following should be made to the forehead:—

℞ Menthol.
Chloroform.
Methyl. Salicyl. - - - - - - aa ʒi.
Lanolin - - - - - - ʒi.

This may be alternated with wrapping the whole head in very hot cloths, which must be renewed as soon as they are no longer of a burning heat. Towards night the following sedative enema is given:—

℞ Quinin. Hydrochlor. - - - - - gr. viiss.
Antipyrin. - - - - - - gr. xv.
Tinct. Opii - - - - - - mx.
Aq. calident - - - - - i. Mss.
Fiat enema.

As health resorts Vichy, Royat, and Contrexéville are recommended.

STOVAINE AND ADRENALINE FOR LOCAL ANÆSTHESIA.

Dr. Blondeau (*Journal de Méd. et de Chir.*, August 25) has found this combination of the greatest use in the daily work of a country doctor. No alarm is occasioned, and there is no sign of syncope, or of irregularity

of respiration. He details a series of minor operations successfully carried out under the influence of this combination, *e.g.*, tooth extractions, radical cure of hydrocele, small lipoma in the neck, sub-peritoneal abscess, ingrowing toe-nail. The addition of the adrenaline makes the operation practically bloodless, but, in vascular tissues, it is necessary to be on guard against secondary surprises due to the temporary masking of small vessels at the time of the operation. He uses 2 c.c. of 1 per cent. solution of stovaine with 4 drops of the 1°/₀₀ adrenaline solution.

From a Thèse de Paris of recent date, several prescriptions are given for local anæsthesia in the same journal (Lucas-Champonnière's), some of which are here reproduced :—

℞ Stovain. - - - - - - gr. vijss.–xij.
Aq. dest. - - - - - ʒ iiiss.

To be sterilised in an autoclave, and sealed up in bulbs for eye surgery :—

(*a*) ℞ Stovain. - - - - - gr. xv.
Sol. Sodii Chlorid. (7°/₀₀) - - - - ʒ iijss.
Sterilise and preserve in bulbs for injections.

(*b*) ℞ Stovain. - - - - - - ʒ j.
Sol. Sod. Chlorid. (7°/₀₀) - - - - ʒ iiiss.
Sterilise for instillations.

For carious teeth :—

℞ Phenol. crystal.
Menthol.
Stovain. - - - - - - āā gr. xv.

Moisten a pellet of cotton-wool with this, and place in the cavity.

For piles and anal fissures :—

℞. Stovain. - - - - - - gr. iv.
Sol. Adrenalin. (1°/°°) - - - - - ʒ ss.
Lanolin.
Vaselin. - - - - - āā ʒ iss. M.

For cracked nipples :—

℞. Stovain. - - - - - - gr. iv.
Balsam. Peruvian. - - - - - gr. xv.
Lanolin. - - - - - - ʒ v.

For piles (a suppository) :—

℞. Stovain. - - - - - - gr. ½.
Ext. Belladonn. - - - - - gr. ss.
Ol. Theobrom. - - - q. s. for one suppository.

For a spray in throat affections :—

℞. Stovain. - - - - - - gr. iss.
Menthol. - - - - - - gr. iv.
Alcohol (45°) - - - - - - ʒ iij.

For dentition :—

℞. Stovain. - - - - - - gr. iss.
Tinct. Croci - - - - - - ♏x.
Syrup. - - - - - - ʒ iij.
To be rubbed on the gums several times in the day.

VERATRUM VIRIDE.

This drug is finding favour in America and Italy. The *Revue de Thérapeutique* (Sept. 1, 1905) records a case of puerperal eclampsia in which 20 drops of the tincture, given every two hours, proved quite successful, where chloroform had failed, and bleeding was contra-indicated on account of severe post-partum hæmorrhage.

In the July number of the *New England Medical Monthly*, Dr. Hardison, of Tennessee, commends the drug as an excellent sedative. It does not relieve pain, or produce sleep, nor does it produce constipation like opium, or paralysis and dangerous congestions like the coal-tar derivatives; or heart failure, like chloral and cocaine. A soothing and calming effect is produced, which is of great value in eclampsia and epilepsy. For the latter, Hardison considers it far more certain and effective than bromides. The longer the drug is taken the less of it is required to influence the patient. Hardison thinks there is a wide field for its use in all cases of restlessness, vigilance, insomnia, &c., associated with high arterial tension, whether due to toxins or not. Improvement follows its use in any condition, due to exaggerated action of the heart, and it is most useful in warding off convulsions in excitable children. The dosage must be ascertained by careful trial, beginning with a small dose; for example, two drops every few hours, or even ten drops every hour, until the effect is produced.

NEURONAL. (BROMO-DIETHYL-ACETAMIDE.)

An extract from M. Artarit's Thèse de Paris (1905) appears in the *Revue de Thérapeutique* (1 Sept.). Based upon a careful clinical study of 53 observations, the author arrives at the following conclusions:—

1. In doses of 15 to 30 grains, neuronal possesses a real hypnotic action, particularly effective in insomnia, the insomnia of maniacal conditions, or due to moral or psycho-sensorial causes, to grief or automatic action.

2. It has no cumulative effect, and can be given every day for several weeks, without giving rise to any trouble. Tolerance is not established, so that stopping the administration occasions no inconvenience; its effect lasts for some days.

3. It has an unpleasant taste, which can be masked by essence of lemon, or bitter orange peel.

4. It is of no avail in the convulsive attacks of epilepsy, contrary to what had been originally expected.

5. It has no harmful influence on the functions of respiration and circulation. In toxic doses, it appears to bring about a paralysis of the striated and smooth muscles (intestinal stasis, &c.); the bromine passes very quickly into the urine, and provokes no skin eruption. In the blood, no change is induced in either the number or the shape of the corpuscles.

FOR URTICARIA.

The following has been found useful in allaying the irritation and itching of urticaria (*Progrès Médical*):—

℞ Acid. Thymic - - - - - - - gr. xv.
Acid. Carbolic - - - - - gr. xxx.
Menthol. - - - - - - - - gr. iv.
Eau de Cologne.
Sp. Camphor. - - - - - āā ʒ iijss.

To be applied by cotton-wool swabs to the parts affected

FOR FLATULENCE.

The Wiener therapeutische Zeitung gives the following :—

℞ Sodæ Bicarb.
Magnes. Carb.
Pulv. Rhei - - - - - - āā ʒi.
Ol. Fœniculi.
Ol. Carui.
Ol. Menth. Pip. - - - - - - - - āā ʒss. M.
Fiant pilulæ xx. - - - cap ij ter. quotidie post cibum.

TREATMENT OF PARALYSIS AGITANS.

This subject is dealt with in the therapeutic section of the *Deutsche med. Wochenschrift* (Oct. 26, 1905). The writer points out that isolation often causes the patient to concentrate his attention upon his trouble. Physical methods must be employed with great discretion ; washing, warm baths, and friction must be carried out with much gentleness, while massage is out of the question. Passive movements, on the other hand, are able to make the tremors disappear during such time as the *séance* lasts, and only in the part actually under treatment ; but, in addition to this effect, something is done to oppose the onset of rigidity. It is a good thing to have several *séances* every day, each of five to ten minutes' duration. Active movements are seldom required.

Some cases get benefit from the four-celled electric bath, or bi-polar faradism. Suspension and stretching the nerves only do the patient actual harm, and Charcot's *fauteuil vibrant* is useless.

The following are recommended for internal treatment :—Tincture of veratrum viride and gelsemium sempervirens in small doses ; hydrobromide of scopolamine by hypodermic injection, beginning with doses of 0·0001 gramme (1/640th of a grain), is a most efficacious remedy. It is necessary to find out, by cautiously and slowly increasing the dose for each individual, the amount which is active without giving rise to toxic effects. When this is once determined, the drug may be given for a year, or more, without losing any of its good effects. Hyoscine produces similar effects in some cases, and less minute doses are necessary than in the case of its congener ; it influences tremor and muscular rigidity specially.

Mental treatment is most usefully directed towards keeping up the patient's courage and ridding him of his fancies. Hypnosis has been of good effect. Opotherapy has proved to be of no avail.

Higier gives a daily dose of hyoscine (1/320th to 1/200th of a grain) in a pill before the mid-day meal. An hour's sleep results after the meal followed by three or four hours' freedom from tremor. Continued treatment results, as a rule, in persistent lessening of the tremor.

LUMBAR PUNCTURE IN FRACTURES OF THE SKULL.

At a recent meeting of the Société de Chirurgie of Paris, a discussion took place on the value of lumbar puncture in fractures of the skull. Quénu introduced the subject, and described a case of fracture of the base of the skull, in which he had been obliged to perform lumbar puncture every day for a week, beginning on the second day after the injury was sustained.

The fluid withdrawn at first contained blood, but gradually cleared. The result of each puncture was the disappearance of the coma and a lengthening out of the lucid interval. The patient was well in six weeks, and Quénu attributed the good effects of the treatment to the suppression of hypertension, and perhaps also to the removal of blood, which has a toxic effect upon the nervous system. Tuffier was not able to claim favourable results in all his cases, but reported one of suppurative meningitis in which he had punctured and obtained purulent fluid. The puncture was repeated several times, and a cure had been obtained. Potherat reported a successful case in which blood was present in the fluid withdrawn by puncture. Fractured base had been previously diagnosed, caused by a fall from a motor-cycle. Terrier advised puncture in these cases, if only to relieve the terrible pains often present. Rochard doubted the diagnostic value of the presence of blood, as he had come across cases in which blood had been obtained, but was found to be due simply to cerebral commotion.

An important practical point was brought forward, and insisted on by other speakers, concerning the amount of fluid withdrawn at each puncture. It must only be in small quantity, otherwise the bulb may be exposed to pressure, which may prove rapidly fatal. Potherat reported a case of compression of the bulb by a cerebellar tumour. Fifty grammes of fluid were withdrawn at one sitting from the lateral ventricle. The temperature rose to 105° F., and the patient died very quickly. The tumour was found to be pressing upon the floor of the fourth ventricle.

SODIC NITRITE FOR THE LIGHTNING PAINS OF TABES.

In a recent lecture at the Salpêtrière, Professor Raymond pointed out that it is an error to suppose that mercurial injections in intensive doses will always cure lightning pains. The remedy is often at fault, but it is undoubtedly best to begin with it in every case, and to keep it up for six weeks, since a specific lesion may be in course of development, the progress of which is hindered by the large doses of mercury. If no improvement has been obtained at the end of six weeks, it then becomes necessary to make use of another method, the subcutaneous injection of nitrite of soda. Fifteen minims of a one-per-cent. solution of nitrite of soda (℞. Sodii Nitritis gr. iss.; Aq. destill ʒiij.) are given by hypodermic injection every day for a period of ten days. Then follows an interval of ten days. The injections are then resumed for a further period of ten days, but the dose is now doubled, by using a two-per-cent solution in place of the one-per-cent. Another interruption of ten days is made before resuming the injections, which are now given of a three-per-cent. solution. This ten-day alternation of injections and interruptions is kept up until, after forty to fifty injections have been given, not before, benefit is obtained. It is nearly constant.

Professor Raymond showed a young woman in whom this treatment had been a complete success. Married at the age of 18, she became infected in the first year of her married life by her husband, who had suffered from syphilis two years before, but believed himself to be cured. She became pregnant when 22 years old, and felt lightning pains in the legs from the first month of pregnancy. She was delivered of a six-months fœtus, which lived a few minutes. Three years ago she suffered from double iritis. At the present time, the patellar and Achillean reflexes are absent, and the

pupils have lost their reflex to light and accommodation. Romberg's symptom is slightly present when walking, and when the eyes are closed. The lightning pains had persisted, and the patient had been placed under specific treatment in vain. Mercurial injections produced no relief, but the nitrite of soda given hypodermically,—24 injections in 3 series—has brought about marked relief. Vaso-dilator treatment in effect acts better than mercurial. This is a practical point of first importance, which may be trusted to render most valuable services to physicians. (*Journal des Practiciens*, 2 Dec., 1905).

XYLOL IN SMALL-POX.

Belin and Salomon published in *La Tribune médicale* (21 Oct. 1905), the results obtained by them from the use of xylol given internally in small-pox, as suggested by Vichnewsky of Tsarskoe-Selo. The ordinary methods of treatment adopted by them in the cases under their care in a temporary hospital at Aubervilliers had resulted in a mortality of 37 per cent., which amount they wished to reduce.

Xylol is a mixture of three di-methyl-benzines. It was given by drops in wine, and was easily taken and well borne. The dose varied from 70 drops a day in the slighter cases to 120 in the grave cases. Two children (ten months and three years) were given 15 to 40 drops in sterilised milk. In the course of a nine months' experience the mortality fell to 12·34 per cent. Cases primarily hæmorrhagic were all fatal, but a notable proportion of the secondarily hæmorrhagic cases were cured. Confluent cases with fatal prognosis were all cured.

Xylol, as is well known, clears tissues that it penetrates, hence its use in histology; in small-pox it prevents the eruption from "coming well out." But by spoiling the eruption, xylol prevents the disfigurement of the patient, and this result can be obtained even when the administration is only begun at the suppurative stage. The pustules shrivel up, are dried, and give place to a scab of no great thickness, while the eruption disappears quickly.

Its effect upon the temperature is not constant, and the same is the case as regards complications. The repulsive stench exhaled from small-pox cases entirely disappears if they are treated with xylol. In by far the greater majority of cases examined by the authors there was complete freedom from scarring.

No caustic or toxic effects have been observed. The authors suggest that the drug deserves to be tried in certain cases of eczema and psoriasis, in general burns, &c.

THE ACTION OF BROMIDE OF AMMONIUM.

Charteris publishes in the *Therapeutic Gazette*, (Nov., 1905), the results of his experiments upon the action of this salt, which is composed of two substances, the actions of which are diametrically opposed to each other. The experiments were carried out with a view to determine which of the two actions predominates in the salt, the stimulant action of ammonium, or the depressant action of bromine. The experiments show that either action can be procured by varying the dose. With large doses the stimulant action is rapidly produced, and fatal convulsions supervene. The bromide action is slower in appearing, and in non-poisonous doses is the one that eventually

appears. Charteris therefore thinks that no benefit is obtained from using the combined action, as that of the bromide is only evident after long administration, while the stimulant action of the ammonium soon passes off. He concludes that :—(1) the bromide of ammonium is more toxic than the bromide of sodium ; (2) with large doses the predominating action is due to the ammonium, whether the drug be given by the mouth, or by subcutaneous or intravenous injection ; in sufficient doses it causes convulsions and death from respiratory failure ; (3) the effect on the isolated frog's heart is not marked, but on the intact mammalian circulation intravenous injections cause a marked rise of pressure, attended with slowing of the rate and more powerful beat ; (4) with repeated non-toxic doses, a bromide action may be produced.

TREATMENT OF DIARRHŒA IN CHILDREN.

There are four drugs which are trustworthy in the treatment of diarrhœa ; calomel, castor-oil, bismuth, and opium. Castor-oil should always be used at the onset, giving place to calomel if it is not retained. Calomel should be given in doses of $\frac{1}{10}$th of a grain every half hour, until 1 grain has been given. Bismuth subnitrate gives good results when given in not less than 10 grain doses every two hours, so that black stools are obtained. To be effectual, the sulphide of bismuth must be formed in the bowel, and if a dose passes through unchanged, one grain of precipitated sulphur must be added to each dose of bismuth. The large doses of bismuth are continued until the child can take milk, and then in half-doses until full milk diet is taken, or constipation ensues. Opium should be given in Dover's powder, one-quarter to one-half grain every two or three hours, for a child one year of age, and should only be employed when there is tenesmus with frequent watery stools. The greatest care and judgment are requisite.

Flushing out the colon should only be used for cases passing a moderate number of loose, green, mucous stools, and, as a rule, once in 24 hours. Normal saline solution is the best irrigant, made warm or even hot if collapse is present. The washing out can be effected by means of a soft rubber catheter, No. 14 English, connected to a receiver which must be held about three feet above the patient's body. The child must lie on its back or left side with legs well drawn up. The well-oiled tip of the catheter is passed into the rectum, and the water allowed to flow slowly in when two inches of the catheter have been introduced, this facilitates further introduction. The folds of the buttocks must be kept pressed together until the colon is full. A child of 18 months requires 24 to 30 ounces of water to effect this. As soon as this amount has passed in (or even rather less), the pressure on the anus is relaxed so that the water can flow in and out. (Kerley, *Med. Record*, July 1905, quoted in *Therap. Gaz.*).

Reviews of Books.

A Handbook of Clinical Electric Cystoscopy. By E. Hurry Fenwick, F.R.C.S. Surgeon to, and Lecturer on Clinical Surgery at, the London Hospital. Pp. 560, with 31 plates, many coloured, and 144 figures in text. London: J. and A. Churchill. 18s. net.

This book forms a comprehensive monograph on the subject of the diagnosis of diseases of the urinary tract by the electric cystoscope, and is an important contribution to the literature of urinary diseases. The work is of special importance and interest, as it is not a collation from the writings of other workers in this branch of surgery, but an embodiment of the personal experience of the author.

A new method of investigation always leads to a mortification of pre-existing ideas, and what the ophthalmoscope has been to the oculist, the cystoscope has been to the urinary surgeon, a valuable means of diagnosis, at the same time an instrument needing skill in its use, and experience in order to interpret the phenomena observed.

The author gives an account of the various types of the instrument from its earliest to its latest developments, including the photographic cystoscope, by means of which actual photographic records of the living and intact bladder may be obtained. A clear and comprehensive account of the cystoscopic appearance of the normal bladder follows, and is illustrated with some excellent coloured plates.

The appearances presented by the various abnormal conditions of this viscus are described, and the value of the text is enhanced by the coloured plates and the notes of illustrative cases.

An admirable section on renal diseases is given from the point of view of the cystoscopist, showing how it is not only possible to determine with accuracy which kidney is affected, but also to hazard a suggestion as to the nature of the affection. For example, œdema of the orifice of the ureter is highly suggestive of an impacted stone in the ureter, while a petulous "golf hole" ureter indicates a degree of atony of the ureter, and usually means tuberculosis of the corresponding kidney. This affection of the kidney, in its later stages, presents other deformities of the orifice, culminating in the drawing up of the opening into the apex of a funnel-like process of the bladder, as the ureter thickens and contracts.

The author points out how light can be thrown on many obscure urinary disorders by the use of the cystoscope; in cases, for example, of hæmaturia without pain, or any other localising symptom. And, further, that, with increasing accuracy of diagnosis by means of this instrument, the meaning of symptoms becomes clearer, even when there is no opportunity for invoking its aid.

The Maintenance of Health in the Tropics. By W. J. Simpson, M.D., F.R.C.P.; Professor of Hygiene, King's College, London; Lecturer on Tropical Hygiene at the London School of Tropical Medicine. Pp. 118. 11 illustrations. Crown 8vo. London: John Bale, Sons & Danielsson, Ltd. 2s. 6d.

This capital little book is published at the request, and under the auspices, of the London School of Tropical Medicine, for the use and guidance of the general public. The idea of a short popular handbook, dealing with the dangers to be guarded against in the Tropics, and how best to guard against them, is admirably carried out.

The book is, therefore, most strongly recommended to all those residing, or about to reside, in the Tropics, or in any malarious region.

At first sight the list of drugs, recommended to form part of a tropical equipment, seems unnecessarily large. Further reflection, remembering the difficulty, ofttimes occurring in out-of-the-way stations, of quickly procuring necessary drugs when urgently needed, convinces one of the excellence and soundness of the advice as given.

One small point may be suggested:—The direction that tabloids of quinine should be well crushed to powder before taken, might be extended to nearly all tabloids transmitted for use to the Tropics.

Mucous Membranes Normal and Abnormal, including Mucin and Malignancy. By Wm. Stuart-Low, F.R.C.S., Assistant-Surgeon Central London Throat Hospital; Honorary Secretary British Laryngological Association. Pp. 55, with appendix and index. 2 plates. London: Baillière, Tindall & Cox.

This little work, originally a lecture at the Polyclinic College, is the outcome of work done by the author on the subject of the mucous membranes and mucus. Very little attention has been paid to this, apparently insignificant matter, but, in the author's hands, it assumes an importance which he certainly justifies. He first describes the arrangement and distribution of the mucous membranes of the body, and, after a hasty glance at the comparative anatomy of the subject, deals with the physiology, pointing out the very large part that mucin plays in the internal economy, not only in gross amounts, as in the alimentary tract, but in the minute but universal use as the cementing material of the cells of all tissues of the body. In this latter aspect is suggested the connection of mucin, or rather the absence of the normal mucin, with malignant growths. Loss of the lubricator allows inter-cellular friction, and causes irritation. The same want of efficient lubrication on the surface of mucous membranes, *e.g.*, œsophagus, stomach, large intestine, exposes the superficial cells to irritation by food particles, HCl in the stomach, &c.

It is attention to the seemingly infinitely little that gives rise to such far-reaching and important consequences, for what after all is asepsis, but a scrupulous cleanliness in every detail? It may well be that the subject matter in the treatise before us, insignificant though it may appear at first sight, is one which may lead to important results. It is well worthy of more attention and fuller observation.

The proposed additions to the nomenclature of diseases are rather terrific in appearance, *e.g.*, hypomyxia, myxasthenia, &c. Perhaps time and use may soften them down into something more homely.

Hysteria and Neurasthenia. By J. Michell Clarke, M.A., M.D. (Cantab.), F.R.C.P., Professor of Pathology, University College, Bristol; Physician to the Bristol General Hospital. London: John Lane. Price 5s. net.

This volume aims at presenting a concise account of hysteria and neurasthenia from the clinical standpoint. The author, in spite of the peculiar difficulties of his subject, has succeeded in producing an eminently readable volume of handy size. The diseases are fully described without over-elaboration of detail; emphasis is laid on the salient points, while local phenomena are illustrated by a series of photographs.

In the diagnosis of hysteria, special prominence is rightly assigned to the positive signs or "stigmata"—such as the peculiar anæsthesia and the limitation of the fields of vision, which are generally only discovered on special examination. It is a pity that the author uses the term "segmental" to denote the stocking-like distribution of hysterical anæsthesia (generally analgesia), since it may lead to confusion with the organic type, due to spinal segment or nerve root disease. In the description of hysterical pseudo-angina, stress is laid on the development of cutaneous hyperæsthesia over the site of pain, yet Head has shown that this is of common occurrence in the organic type. The treatment of neurasthenia is well described and adapted to the various symptoms.

Natural Science in Hygiene, or the Life-history of the Non-bacterial Parasites affecting Man. By James Rodger Watson, M.A., B.Sc., M.D. (Edin.), D.P.H. (Camb.). Pp. 60. Figs. 17. Bristol: John Wright & Co. London: Simpkin, Marshall, Hamilton, Kent, & Co., Ltd. Price 1s. 6d. net.

We must congratulate the author of this little book on its excellence. Although originally intended for students of public health, it can be confidently recommended to all who are interested in medical science. Of especial interest are the short article upon Ergot, that upon the life-cycle of the malarial protozoon, which is accompanied by an excellent diagram, and that on thypanosomiasis, which includes a short account of the more recently discovered Leishman-Donovan bodies, which occur in cases of malarial cachexia.

The Ritual of Temperance and State Hygiene; Contributions towards a Rationale in National Healthiness. By H. Cooper Pattin, M.A., Doctor in Medicine and Diplomate in Public Health of the University of Cambridge; Medical Officer of Health for Norwich. Norwich: Agas H. Goose, Rampant Horse Street. 2s. 6d. net.

This is a very sensible little book, for it deals with some of the most momentous problems of everyday life in so simple, and at the same time in so impressive a way, that it cannot fail to appeal to the intelligence of those who may have the good fortune to read it. When Dr. Pattin starts with the statement that *true intemperance is the subordination of the interests of the race to the gratification of the individual*, we feel that he is on solid ground, and when he clearly points out the mischief caused by the intemperate use of alcoholic, caffeinic, and aqueous

stimulants, we are impressed with his value as a public teacher. In his preface he says "that our best hope of attaining to a rationale in national healthiness lies in adding a peremptory requisition for rationalised teaching in personal, communal, and state hygiene to our statutory minimum in elementary education." Quite recently a controversy has arisen about so-called temperance lectures in our public elementary schools, and a great deal about temperance has been intemperately said. If Dr. Pattin's chapters on the "Ritual of Temperance" could be separately published and made the basis of temperance lectures, or as a text-book on the subject for use in our schools, a real want would be met.

Our space will not permit too detailed a reference to the other chapters, which are practically independent of each other, but we would like to especially commend that on "Baths and Bodily Cleanliness," and the two Appendices on "The Influence of Smoking upon the Growing" and on "Milk and the Feeding of Infants." In a recent issue of THE PRACTITIONER valuable articles appeared on the former subject, and Appendix B. may be said to afford a useful *résumé* in a popular form of much that was advanced in these articles. We commend Appendix C., on the feeding of infants, to the careful attention of every English mother.

Materia Medica of Vegetable and Animal Origin, with Notes on the Properties, Uses, and Constituents of Crude Drugs. By JOHN HUMPHREY: with an Introduction by E. M. HOLMES, F.L.S. Pp. xiii+495. London: Henry Kimpton. Price 5s. net.

A SUCCINCT account of the numerous vegetable and animal drugs used in general medicine has hitherto been a desideratum. There are many treatises upon the subject, which have been compiled with a view to enabling the medical student to meet the requirements of the different examination schedules; and there are other works of a more elaborate character, in which are to be found historical and other details, which have no bearing upon the practical work of the medical profession. But a need has been felt for a book giving full and accurate particulars of all the drugs which go to make up the armoury of the up-to-date physician. Mr. Humphrey's book professes to supply this need. In it the names of the drugs are arranged alphabetically. The information given in each monograph comprises the botanical, or zoological, origin of the drug, its geographical origin, preparation and collection, notes on its therapeutic properties, its galenical preparations, a precise description of it, its chemistry, and the character by which it can be distinguished from similar substances. We think the author has done well to make his book so comprehensive, because its value as a work of reference is thereby greatly enhanced. The typography is excellent, and the paper thin and opaque. The name of Mr. Holmes, the Curator to the Pharmaceutical Society Museums, at the foot of the introduction would be a guarantee that Mr. Humphrey's work has been thoroughly done, if we did not already know the author's attainments as exhibited in "Pharmacopedia" which we reviewed on a former occasion. As a work of reference it cannot be excelled, and as an aid to the study of materia medica we think it will soon be found to be indispensable.

Essentials of the Practice of Medicine. Prepared especially for Students of Medicine by WILLIAM R. WILLIAMS, A.M., M.D., formerly Instructor in Medicine and Lecturer in Hygiene, Cornell University Medical College. Pp. 460. 2 diagrams. London: Henry Kimpton. 6s. net.

THIS compilation is a cram book, naked and unashamed. Like compressed or concentrated foods, such books may serve a temporary purpose, but cannot be recommended for regular use by the normally intelligent student. Written examinations are obviously the "fons et origo mali," and until these are made less bookish and more clinical the genus cram book will have an excuse for its existence. The ideal result of examination is the survival of the fittest. Books such as this are a conspiracy to defeat this ideal.

The Diagnosis and Treatment of some of the Common Diseases of the Rectum and Anus. By CECIL H. LEAF, M.A., M.B. (Cantab.), F.R.C.S. (Eng.); Surgeon to the Cancer Hospital and the Gordon Hospital for Rectal Diseases. London: E. H. Blakeley. 3s. 6d.

THE scope of this book is indicated by its title. It has one good feature, viz., the great importance of local examination in every case of disease of these parts is emphasised and enforced.

Appendicitis and other Diseases about the Appendix. By BAYARD HOLMES, B.S., M.D., Professor of Surgery in the University of Illinois; Professor of Surgery in the American Missionary College, Chicago; Attending Surgeon, the Chicago Baptist Hospital. Pp. 350, with 7 plates and 39 figures in text. New York: Appleton & Co.

To the literature of appendicitis it is very difficult to add anything that is new. The author of this book has not added anything that is strikingly new with the exception of some new terms, such as "dorsad," "cephalad," but these are very doubtful improvements on the older and better understood nomenclature. The "caudal peritoneal cavity" is a term which is open to criticism.

The author is exceedingly dogmatic in his statements about this disease, more so than the present state of our knowledge warrants.

His dogma is summed up in the following paragraph:—

"Every case of appendicitis is a case for appendicectomy. The acute cases should be operated upon at once, the chronic cases as soon as the best surroundings can be secured. Ideal appendicectomy ought not to require an incision longer than an inch in the thin, and an inch and a half in the fat patient; it ought not to require more than four or five days in hospital and away from work or business."

Chapters are also given on other acute and chronic diseases of the abdominal contents.

The Preparation and After-Treatment of Section Cases. By W. J. STEWART MCKAY, M.B., M.Ch., B.Sc., Senior Surgeon to the Lewisham Hospital for Women and Children, Sydney. 10 plates and 134 illustrations. London: Baillière, Tindall and Cox. 15s. net.

To every surgeon, the preparation and after treatment of his operation cases, must be a matter of highest importance. In this large book both these aspects are fully considered. It is the outcome of the author's own

experience, and gives a detailed account of the methods which he employs. That the book has not been written with any undue haste, is evidenced by the fact that the notes on which it is founded were commenced 10 years ago. No doubt, too, this has contributed to its bulk, "anything and everything that could be a help to a young surgeon" being set forth.

The book is readily divisible into two parts. The first nineteen chapters being devoted to an account of the preparation of the patient, furnishing of theatres, sterilisation of instruments and ligatures, &c. This part is copiously illustrated by figures borrowed from surgical instrument makers' catalogues. So many alternative methods of sterilising instruments and ligatures are given, that we are afraid the young surgeon may be bewildered by "anything and everything" set out in these chapters. For instance, there are nine or ten different methods of preparing catgut given in detail. The author does not indicate which of these he recommends.

The second part of the book deals with the after-treatment. and the complications which may arise, and is the really valuable portion. The various symptoms are discussed, and the methods of relieving them are pointed out. We would also especially refer to the discussion on the question of giving morphia after abdominal sections. With the author's opinions on this subject, we are in entire accord, specially as to the good effect to be obtained by giving small doses of the drug, $\frac{1}{12}$ grain, repeating it, if necessary, rather than giving the large dose at one time. The remarks on the value of strychnine and saline solution in the treatment of shock are very much to the point. In the discussion on purgatives, Dr. McKay points out that the best way to give calomel, which is the drug he most often uses for these cases, is to give it in small doses repeatedly, and not in a single large dose, and that it is often necessary to combine it with some other drug, such as elaterium, which he prefers. He only uses castor oil occasionally. The book, especially the second part, is one which can be recommended to every surgeon, as it is eminently practical.

Electrical Methods in Affections of the Stomach and Intestines. By GEORGE HERSCHELL, M.D. Lond., Senior Physician to the Queen's Jubilee Hospital, &c. London: Siegle, Langham Place. Price 3s. 6d.

THIS practical manual reproduces a series of papers contributed to the *Journal of Medical Electricity*, with the addition of a few clinical histories. The different methods of applying electricity are fully described, and intragastric electrodes, so far as possible, avoided. The author favours the employment of the simpler electrical currents, within the reach of the average practitioner, rather than those forms which demand expensive apparatus and expert knowledge. Dr. Herschell is no blind enthusiast, for he himself only uses electrical methods in some 20 per cent. of his gastric cases, and then generally in conjunction with ordinary measures. His greatest success has been attained in functional disorders—especially neurasthenic—which are less amenable to drug and diet treatment.

A decided drawback to electrical methods seems to be the number of applications necessary in the majority of cases, extending over two months. As they are to be used chiefly for chronic cases, this objection can be overcome, but, in many cases, it is difficult to eliminate the concurrent effects of dieting and suggestion.

Practical Notes.

THE TREATMENT OF CHRONIC CONSTIPATION. — In dealing with this important subject, we may conveniently divide it under the two following heads:—(A) The constipation of adults; and (B) the constipation of young children.

(A) Before any definite treatment can be decided upon, the causes of the condition must be carefully considered, and, if possible, removed; for we must insist, at the outset, that commencing with drug treatment for chronic constipation is decidedly unscientific. There are numerous *general causes* of constipation, and the following are some of those usually met with :—i. Irregular habits with regard to evacuating the contents of the lower bowel, that is, neglecting the call of nature. A person should endeavour to get the bowels to act at about the same time daily, and, as a rule, soon after breakfast. With many men, the after-breakfast smoke is an infallible remedy. ii. In some families there appears to be a hereditary predisposition to a sluggish action of the bowels. This may be to a great extent overcome by trying to bring about some rhythmical peristaltic movement of the bowel, and by endeavouring to get it to act at about the same time daily. iii. Sedentary habits. The effect of these is seen in those who, for many hours daily, have to keep at office work with little, or no, time for proper exercise, such as walking, bicycling, &c. This type of constipation may be remedied by a judicious adjustment of the habits of the individual. iv. There are many general diseases associated with constipation, such as the acute specific fevers, primary and secondary anæmias, chronic dyspepsia, and those conditions which interfere with the proper transmission of bile into the duodenum. The treatment in such cases is obvious. v. Errors in diet may cause constipation. As an example may be mentioned a diet which is too restricted, and which leaves but little residue in the intestine; milk and animal food, for instance, predispose to constipation. A small amount of ordinary salt added to milk will to some extent overcome constipation ; while vegetables, which include

indigestible cellulose, taken with animal food, are advantageous. Persons who drink tea excessively, and water sparingly are often constipated. The usual remedy for this condition is either a tumblerful of unadulterated hot water taken before going to bed, or one of cold water taken slowly when rising in the morning. vi. Habitual drug taking will induce chronic constipation. This occurs in those who are addicted to the use of opium and morphia, and in those, too, who habitually take drugs for the purpose of stimulating the bowels to action, and who are alike victims of this complaint. In the latter case the bowels, as may be said, absolutely refuse to act without the usual stimulus.

Amongst the *local causes* of constipation, the following are sufficiently important to be especially considered. i. Atony of the large bowel such as may occur in neurasthenic conditions and in hysteria. This may be overcome by the use of nux vomica, or strychnine. ii. The peristaltic movements of the large intestine may be interfered with by tumours, which press upon the intestinal wall, such as a pregnancy, fibroid tumours of the uterus, large ovarian cysts, and purely pelvic tumours; the latter must, of course, be dealt with before the constipation can be overcome. iii. Chronic intussusception is a cause of constipation. For this condition, as a rule, operative treatment is required. iv. Strictures occurring in the wall of the sigmoid flexure of the colon and rectum must be remembered. These may be of the simple type, such as occur after dysenteric, syphilitic, or stercoral ulceration of the bowel wall; or malignant, as may occur in the ring columnar carcinoma of the sigmoid flexure or rectum. All these conditions, as a rule, require local and appropriate treatment, and the same may, of course, be said of simple polypi of the lower bowel. Having considered the various possible causes of chronic constipation, and when about to take a case in hand for thoroughly rational treatment, one would naturally determine on the appropriate course to be adopted. The first thing to be done is to get the patient to contract a regular habit of going to stool, at about the same hour every day, and, if possible, some bodily exercise should be previously undertaken. Further, some rather more violent exercise, such as vigorous walking, bicycling, horseriding, cricket, tennis, football, or golf should

be indulged in once or twice weekly. Food should be so regulated that the diet should be somewhat bulky. With this end in view, some of the following articles should be taken, plenty of vegetable material, especially salads and tomatoes, porridge, brown bread, fruits, and occasionally a good draught of water. If the person is stout and the abdomen pendulous, and its muscles weak, the patient should wear some kind of abdominal support. Friction, or regularly applied abdominal massage, is occasionally found to be beneficial. Sometimes a metal ball, weighing from four to five pounds, rolled over the abdomen every morning for from five to ten minutes, or even longer, is found to be effective. Drug treatment may then be resorted to, but it must be an absolute rule that drug treatment should *not* be commenced before those of the above mentioned methods, suited to the case, have had a fair trial. Meigs recommends the following combination :—

℞ Extract Belladonnæ - - - gr. $\frac{1}{12}$
Extract. Nucis Vomicæ - - - - gr. $\frac{1}{4}$
Extract. Colocynthidis - - - gr. ij
In pil. - - - - - - - j.
One pill to be taken three times daily.

Dr. Burney Yeo says : "there are a number of medicinal expedients for relieving the milder forms of habitual constipation ; few are better than the more or less regular use of a *dinner pill* such as the following :—

℞ Aloes Extracti - - - - gr. jss.
Ipecacuanhæ Pulveris - - } āā gr. ss.
Nucis Vomicæ Extracti - - }
Quininæ Sulphatis - - - - gr. j.
Saponis - - - - - gr. ss.
Misce, fiat pilula. One pill to be taken immediately before dinner.

The following formula has been found to be an effective one :—

℞ Aloinæ - - - - - gr. $\frac{1}{4}$
Strychninæ Sulphatis - - - gr. $\frac{1}{48}$
Extracti Belladonnæ viridis - - gr. $\frac{1}{8}$
Pulveris Ipecacuanhæ - - - gr. $\frac{1}{3}$
Misce, et fiat pilula. One pill to be taken daily.

Employed alone, belladonna seems to be more efficacious in the case of women than that of men, and appears especially applicable to those cases of constipation, in which a painful condition of some of the pelvic viscera (uterus or ovaries) tends to constipation by inhibition of intestinal peristalsis.

In cases of chlorosis, or anæmia, it is well to prescribe Confectio Sulphuris ʒ j, to be taken every morning followed by the following mixture :—

℞ Ferri Sulphatis - - - - gr. xij.
Magnesii Sulphatis - - - ʒ j.
Quininæ Sulphatis - - - - gr. x.
Liquoris Strychninæ - - - ʒ ss.
Acidi Sulphurici Diluti - - - ♏ xl.
Aq. - - - - - ad. ʒ viij.
Misce, fiat mistura. Two tablespoonfuls to be taken once daily about one hour before dinner.

A. Schmidt has some new suggestions, based upon some practical experience of their value, to make on the subject of chronic constipation (*Münch. med. Woch.*, Oct. 10, 1905). He believes that the chief cause of chronic constipation is to be found in the exhaustive manner in which food is used up in the process of digestion, so that the very condensed residues contain but few of the products of fermentation and of the fatty acids, which are known to be able to stimulate the peristaltic movements of the large intestine. As a proof of this, he points to the comparatively small amount of odour present in the accumulations. For dealing with this sort of constipation, he proposes the use of bulkier foods, which will leave plenty of residue, such as brown-bread and vegetables, rich in the undigestible cellulose. These, however, are not, as a rule, sufficient for the purpose, so he adds agar-agar to the diet to provide more bulk. Twenty-five grammes (about ʒ vj) of this substance, in its dry condition of small scales, can be taken every day without giving rise to any digestive trouble. In the alimentary canal, the agar-agar swells up, and thus softens the intestinal contents, with the result that the stools are passed much more easily, the swollen substance being found in them otherwise unchanged. Not only are

the stools made softer and more voluminous, but they bring about a spontaneous action and a daily habit. This last result is, however, not invariably obtained, so that Schmidt, in such event, has recourse to the fluid extract of cascara, not in a purgative dose, but in such amount as to replace the excitatory action which is lacking in the products of decomposition.

Other substances were tried in place of agar-agar, among them liquid paraffin given in capsules with a small dose of cascara in each capsule. The dose of paraffin was 30 grammes (about ʒj). The stools became much softer, and contained numerous small drops of paraffin. The intestine was not irritated, and the paraffin passed through unchanged. This use of paraffin is not new, as it has long been tried in America, and the subject is considered in an article on "The use of the heavy petroleum products as intestinal evacuants" in the September number of the *Therapeutic Gazette*.

Synthetic Purgatives.—Dr. Anton Wiesner has a paper in the *Wien. klin. Rundschau* (No. 26/05) dealing very fully with the pharmacology and therapeutics of the new synthetic purgatives. Of these purgatin, emodin, and exodin all belong to the anthraquinone group. Purgatin is anthrapurpurin-di-acetate, and has some irritating effect on the kidneys. It colours the urine red. Emodin is tri-oxy-methyl-quinone, is a safe and agreeable purgative, but is very costly. Exodin is di-acetyl-sulpho-nifogallic-ruid-tetra-methyl-ether, and is useful as a simple purgative, producing no ill-effects. The use of the latest of these—phenol-phthalein—as a purgative was discovered by accident. The substance has long been known in chemical analysis, as it yields a brilliant rose-red colour in the presence of alkalies. A firm in Hungary had produced an artificial wine which they wished to "trade-mark." They made use of phenol-phthalein for the purpose, as being colourless, and not changed by acid. The wine so treated caused an epidemic of mild diarrhœa among the purchasers, so that the original intention had to be abandoned, but a new use was at the same time indicated. It is di-hydroxyl-phthalophenon, and acts as a simple purgative, acting quietly without irritation of any sort, and passing unchanged through the body. Of a dose given by the mouth, 87 per cent. can be recovered from the fæces.

℞ Phenol-phthalein - - - gr. iss.
Sacchar. lactis - - - } q.s.
Mucilag. gum. arabic. - - }

To make 1 pill; 1, 2, 4 or so to be taken as required.

Dr. Bayer of Buda-Pesth has introduced tablets flavoured with vanilla, and known as *Purgen*.

The treatment of chronic constipation in children will be dealt with in a future practical note.

METABOLISM.—In dealing with this subject from the purely practical side, it is well to consider the metabolism of the three chief kinds of foodstuffs, namely, that of the *carbohydrates*, the *fats*, and the *proteids*, separately, although we know quite well that, as a rule, they are taken into the body, digested, absorbed, and assimilated together.

The Metabolism of the Carbohydrates.—It must be remembered that the end products of the complete digestion of carbohydrate food, such as starch, in the alimentary canal are the glucoses, dextrose, levulose, and galactose. These monosaccharides are absorbed by the villi, which are present in the small intestine, and are taken, by way of the portal blood stream, to the liver, where they are stored by the liver cells, as a colloidal substance, which belongs to the group of starches, and is called *glycogen*, or animal starch. Just as green plants have the power of converting sugar into starch, which is stored up as reserve material in their tubers, *cf.* the potato, so the liver is capable of storing up animal starch or glycogen, out of the glucoses supplied to it. As the tissues require carbohydrate material, so the glycogen of the liver is slowly converted into dextrose by a ferment, derived from the liver cells themselves. This dextrose leaves the liver by the hepatic vein. Normally, the blood plasma of man contains from ·05 per cent. to ·15 per cent. dextrose. If the amount rises above ·2 per cent., the excess is excreted by the kidneys, and consequently appears in the urine. The cell islets of Langerhans, which exist in the pancreas between the pancreatic acini, are said to produce an internal secretion, which leaves the pancreas by the blood, or lymph, stream, and probably modifies the dextrose in some way before it

gets to the tissues, or it may be that it stimulates the tissues to assimilate, or take up into themselves, the dextrose supplied by the blood stream. Glycogen also occurs in the muscles, especially in embryonic muscles, in which it occurs in large quantities; it probably goes to these muscles as dextrose, for free glycogen cannot be detected in the blood plasma. Fats, taken as food, have no influence whatever in the formation of glycogen by the liver, but proteids are said to aid in the production of the glycogen in the liver. The tissues have a great affinity for oxygen, which reaches them by means of the arterial blood. The chief substance in the tissues, which is oxidised, or burnt up, is the carbohydrate material found there, and that is dextrose. The result of such oxidization is the formation of carbon dioxide and water; at the same time heat is evolved and energy generated. It will thus be clearly seen what an important part our carbohydrate food plays in metabolism.

(*To be continued.*)

Case for Commentary in the December Number. —The treatment which should have been adopted was that of trephining over the *left* area of Rolando; all the symptoms, to wit, the recurring fits with loss of consciousness and spasms on the right side of the body, *i.e.*, twitchings of the muscles of the right hand and right side of face, and the active knee jerk on the right side of the body, point to an irritative lesion on the left area of Rolando. The swelling of the left optic disc also supports this diagnosis. From the history of the patient, the fall was obviously the result of the early lesion, and the "lump on the head" was a simple hæmatoma. There was certainly no depressed fracture, for the patient seemed "none the worse for the accident." The case was one of focal epilepsy, due to a *sarcoma* pressing low down on the left area of Rolando. The sudden loss of consciousness, which remained for fifteen minutes, during which the breathing became stertorous, was due to a hæmorrhage from the tumour.

Novelties and Notices.

THE ALLENBURY'S TEAT (PATENT).

(Messrs. Allen and Hanburys, Ltd., Plough Court, E.C.)

To those who are compelled to have recourse to the "bottle" for the feeding of young children, and are worried by the frequency with which the teats are pulled off, the announcement of the introduction of Allenbury's Teat will be welcome. This teat automatically holds on to the neck of the bottle, it does not involve the necessity of an independent fastening, and there is but very little fear that a child will exert sufficient force to pull it off. At the same time the teat is as easily put on and removed as any other. For use with different kinds of food these teats are suitably perforated. Those who use them, however, are warned of the necessity for keeping them sweet and clean; this, of course, applies to all similar appliances.

DOCTORS' DIARY AND NOTE BOOK.

(Messrs. Scott and Bowne, Ltd., Stonecutter Street, E.C.)

We have been favoured with this neat, compact little diary which we understand Messrs. Scott and Bowne are forwarding gratis to members of the profession. It is of a most convenient shape and contains much information likely to be of service to the busy medical man. It can be easily carried in an inside pocket, which is an advantage. If by chance any reader of THE PRACTITIONER has not received the diary, we think a postcard to Messrs. Scott and Bowne will produce the desired effect.

COMPETITIONS.

We offer our readers every month two Prizes on the conditions stated below.

A Prize of Two Guineas will be given to the author of the best Essay on a subject to be announced by the Editor.

A Prize of One Guinea will be given to the competitor who writes the best answers to three questions relating to Medical or Surgical Cases.

Results of the January Competitions will be announced in the March number.

a.—The Subject of the Essay for February will be

The Treatment of Hæmaturia of Renal Origin.

b.—Answers to the following questions are invited :—

1. Under what conditions does spontaneous fracture of the femur occur?

2. A woman, aged 25, unmarried, was brought to the hospital suffering from paralysis and inability to speak. The onset of the attack had been sudden, and the patient had been quite unconscious. There was partial paralysis of the right side of the face, together with complete loss of power of the right arm and leg. On the right side the knee jerk was increased; there was slight ankle clonus, and Babinski's sign was present. The patient understood quite well what was said to her; but she was unable to speak. What was the nature of the lesion?

3. A male, aged 50, stated, on admission, that he had had a stoppage of water for several years. He had pain over the pubis and in the glans penis. Instruments had been passed, and he had noticed that there was occasionally blood in the urine. Micturition was hourly night and day. Urine alkaline, sp. gr. 1015, containing a little pus. 45 oz. passed in 24 hours. A number 12 soft catheter on entering the bladder caused great pain. Examination per rectum showed a very tender enlarged prostate, while pressure on the base of the bladder inflicted pain. The kidneys appeared to be normal. The bladder was washed out with difficulty, and internal remedies were administered; but the patient did not improve. He developed cachexia and lost weight. The pain increased and his temperature gradually rose. The bladder was opened in the perinæum and a drain tube leftin. The patient, however, got worse, developed persistent hiccough and died in fourteen days. What was found on post-mortem examination?

GENERAL CONDITIONS.

A.—All MSS. relating to the Essay must be marked on the top left-hand corner "Essay," and must be sent to the Editor of The Practitioner, 149, Strand, W.C., on or before the 1st day of March, 1906. The answers to the above Questions must not exceed eight hundred words.

B.—All MSS. giving answers to the Questions must be marked on the top left-hand corner "Questions," and must be sent to the Editor on or before the 1st day of March, 1906.

C.—No Essay will be returned unless a special request is made, accompanied by a stamped addressed envelope.

A and B.—(1) One side of the paper only must be written on.
(2) The name, or pseudonym, and address of the competitor must be clearly written on each sheet of paper used.
(3) The decision of the Editor is final.
(4) Competitors must be registered General Practitioners.
(5) The attached Coupon must be filled up by each competitor.

THE PRACTITIONER.

MARCH, 1906.

REDUCIBLE INGUINAL HERNIA IN BOYHOOD.

By EDMUND OWEN, F.R.C.S.,
Consulting Surgeon to St. Mary's Hospital, and to the Hospital for Sick Children, Great Ormond Street, London.

In the pages which follow this there will be found no records of cases of hernia treated in any one particular manner; there will be no tabular setting forth of operations ending with the ever-recurring word "cure," or with a percentage of successes calculated to a decimal, with a bare admission here and there of a slight failure, just to show that the patients were human and the surgeon mortal. The paper is, rather, a general consideration of the subject of reducible hernia in boys, and especially with regard to its treatment.

Had it been accompanied by records of operations done, I might have been tempted to say that I had had only one fatal case. I have a clear recollection of one small child dying of pneumonia after an operation on his bulky scrotal hernia, and I can honestly say that I have no recollection of any other fatal case. But were I to make this statement positively, some old House-Surgeon or Dresser of mine, now a Practitioner, alighting upon it, might be in a position to say to himself, "Ah! but I wonder if he has forgotten that child in such and such a ward." The memory of House-Surgeons and Dressers is remarkably clear and tenacious with regard to cases which might be called "failures" (or something worse), whilst that of the operator is rather for successes. This weakness of the latter is only human, but to recognise its existence is to make one a little shy of surgical statistics in general.

And, after all, are percentage calculations of results, even if drawn out with clinical as well as mathematical correctness, of much practical value? I think not. When the family doctor is considering whether he shall advise a child being taken to a surgeon with regard to the performance of an operation upon a rupture which has given anxiety to himself,

disappointment to the parents, and distress to the child, he does not look into a book to see the statistical results of some particular method of treatment. Indeed, it seems almost absurd to try to work out the results of therapeutic measures on any actuarial plan, or to publish records of them somewhat as a stockbroker does his price list.

Though in a series of operations each patient counts as *one*, his actual value in the tables may be such as to spoil an entire column, as the result may be of that nature which the surgeon is prone to forget and his assistant to remember. And neither on an actuarial nor on any other basis can one promise a successful issue to a surgical operation.

CONGENITAL HERNIA.

The term *congenital* as applied to an inguinal hernia does not mean that the hernia existed at birth; the name must have been given by an anatomist rather than a clinician. He who first wrote of a *congenital inguinal hernia* must have had his eye fixed upon the open, tube-like process of peritoneum which is associated with the descending testis. Formerly it was the custom for a man to be an anatomist first and a surgeon afterwards, but now the surgeon is not expected to have had special anatomical training. There is to be no further need of his spending the earliest years of his hospital career in the drudgery of teaching anatomy. And it is fortunate for him, and for his patients, that the main features of anatomy are not liable to the changes which beset certain other branches of science in which, from time to time, he has been called upon to take exercise.

Nature has ordained that the man who is physically perfect should, from the day of his birth, possess his testicles in the scrotum. They were not to be thrown to some hinder part of his body, as a sort of anatomical afterthought, as in the camel. They certainly were not to be left to attain maturity in the hidden recesses of the loins, and there to remain, as in the elephant. Nor were they to descend towards the outer world only for the rutting season, and then to be drawn up again into the abdomen, as in many of the rodents. They were not to be left permanently in the inguinal canals, as in certain of the ant-eaters. Nor were they to be at one time of the year in a state of atrophic idleness, and at another

in irrepressible physiological vigour, as in the buck. They were to be proudly placed where they might remain as evidence of his manhood; but in him, as in all the other vertebrata, they were to be developed from that interesting fœtal gland, the Wolffian body. This was essential in her scheme. In the process of evolution, Nature evidently sets great store by this gland, and she preserves the type with jealous care and constancy, for she ingrafts in mammals, birds, amphibians, and fishes; it may also be found in certain of the invertebrata. And inasmuch as it is the starting point of the kidneys and the reproductive organs, it is in fœtal life a highly important structure. The place of the Wolffian body is in the abdomen: where else, indeed, could it be? And as it is in the abdomen the testes, as well as the kidneys, must necessarily be developed there. And this early situation of the testes is not without disadvantage in the human subject. But that Nature should have been so mindful of the comfort of degenerate European man as to depart from a universal type, in order to plan out a special creation of his testes in the scrotum, would have been, to say the least, unlike her—

"So careful of the type, she seems."

That the carrying out of her original scheme of development is not without occasional trouble is beyond question, and that the open funicular process of peritoneum is the very source of many a fatal catastrophe is a fact which is constantly before us; but, on this account, the surgeon-anatomist does not turn round and accuse Nature of being

"So careless of the single life."

There is no denying the fact that the scheme for the descent of the abdominal testis into its scrotal dwelling-place has, unfortunately, thrown upon the modern European boy a serious risk of fatal strangulation of the bowel. But in her original scheme Nature had not her mind fixed on the degenerate physical result of modern civilisation. Her concern was with the perfect product of the laboratory. It was, beyond doubt, her intention that the vigorous growth and muscular development of the tissues of the inguinal region should render the boy proof against the slipping of a piece of bowel or omentum down the track of the spermatic cord. And I should think that in the South Sea Island baby, who

is put into the water to swim long before he can walk or stand, and in the Zulu boy, the offspring of a splendid physical stock, a hernia is of very rare occurrence. But with modern European parents, taking little exercise, and leading the indoor, self-indulgent life which civilisation seems to demand, and bringing into the world children who are little suited to undergo exertion, and still less to struggle for existence, it is small wonder if the muscles of the inguinal canal are of such poor fibre as to offer but the mildest hindrance to the descent of a congenital hernia.

There is another point in the scheme of modern civilisation which is, perhaps, still more concerned with the hernia-weakness, and that is the question of infant feeding. Old-fashioned as the idea may appear to many, it was Nature's intention that the mother should suckle her child. But, for one reason or another, a large number of the present-day babies are not brought up by breast, but are "tried" with one artificial food after another until some "preparation" is hit upon which does not happen to purge them or make them vomit. But while speculative search was being made for such an artificial food, the infant was miserable and sick, and in the violent expulsive efforts which were thus set up, the hernia made its unwelcome appearances. The various patent foods, I say, were gone through, one by one, until a something was found which did not actually make him sick. But he did not thrive under its use. He may have grown big, fat, and heavy, but, at the same time, he was probably weak, flabby, and rachitic, like the show-boy in the photograph by which the patent food is speciously advertised. It is a difficult matter to deal with a hernia in a child of this sort. In the first place, there is such a thick pad of unwholesome fatty tissue in the inguinal region that the mother and nurse cannot always tell if the hernia is down or not, and if the truss is put on and the pad adjusted when the bowel or omentum is in the sac (as I have known happen in not a few cases), the distress may be great.

The question of feeding is of prime importance in connection with the palliative treatment of hernia in children, especially in young children. In the first place, if the stomach finds the food unsuitable, violent, straining efforts are set up, and the diaphragm being suddenly lowered, and the abdominal

contents being still further compressed by the energetic contraction of the surrounding muscles, a piece of omentum or bowel is quite likely to slip down a funicular process of peritoneum, which has not been duly closed against it. If, though the stomach does not reject the food, the intestine finds it unsuitable, it is quickly hurried out of harm's way in a severe diarrhœa. And as the child strains during the purgation, a rupture is likely to occur. Lastly, if the diet is of such a nature as to cause constipation, and the child has to strain to relieve himself, down comes the hernia. Forced expiratory efforts of every sort must be checked before the hernia can be kept under control, and with this in view inquiry must be made as to the child being the subject of habitual cough, rectal polypus, and so on.

Attention should be particularly given to the matter of micturition. If the prepuce is long and tight, and the opening in it is small, so that the child has to strain to get the water through, circumcision should be done. Similarly, if the meatus urinarius is but a pin-head orifice, it should be dilated. I have recollection of a case in which a stone in the bladder seemed to be the cause of a boy having also a reducible inguinal hernia.

Supposing that no condition likely to be provocative of an inguinal hernia can be found, the surgeon has to adopt the theory of the case being simply one of retarded development, with the result that there has been delay in the closing of the funicular process of the peritoneum, and that, with a little help, Nature may be able to make good the defect by shutting off the communication between the general peritoneal cavity and the tunica vaginalis. But she cannot do this if every now and again a piece of bowel or omentum is thrust through the partition which she is tardily and half-heartedly trying to establish.

Many a hernia can be cured by the intelligent and unwearying use of a thick skein of wool which has its soft, bulky loop firmly hitched over the inguinal canal. But when a child has a large peritoneal aperture, and is the subject of vigorous expulsive efforts, something stronger has to be worn —a truss with a steel spring, for instance. Nevertheless, I have every reason for speaking well of the wool truss. But in some cases even a truss fails to keep the canal securely blocked: the child strains, and, in the most vexatious manner,

down comes the hernia. In these circumstances, I have sometimes seen a truss used with so strong a spring that, not only has the pad caused an ulceration in the inguinal region, but a pressure-sore has occurred where the steel band passed round the loins.

Cases of this sort have, naturally, caused great discouragement and anxiety, and if the subject of the hernia had been able to express his feelings he would, doubtless, have told a sad tale of suffering. Occasionally it happens that the parents have at last given up all hope of the child ever being cured, have left off all restraint, and have allowed the hernia to take its chance, the chief part of the alimentary canal being found bulking in the scrotum.

Supposing that the boy is about three years old, and that for half that time he has been the subject of an unmanageable, or, at any rate, an unmanaged, inguinal hernia, and that his inguinal canal is wide open, what is to be done? This is a problem which is constantly recurring, and it is often a troublesome one. (I am assuming, of course, that inquiry for the causation of hernia has thrown no light on the case.) A wool-skein truss is out of the question for him : it would be like a hay-band for a Samson. And the ordinary spring truss, which has already been tried, does not seem likely to prove of much use, and to operate on the boy straightaway would likely be to invite disappointment, or something worse. The first thing to be done is to put the boy to bed. He cannot be effectually treated if he is running about, or even sitting up. And not only is he to be put to bed, but he is to be treated much as Percivall Pott, a hundred and thirty years ago, advised that a man with a *strangulated* hernia should be treated—for prompt incision was not then the order of the day. Pott said[1]:—

"The posture of the body and the disposition of the lower limbs may be made very assistant in this operation, when the difficulty is considerable ; the nearer the posture approaches to what is commonly called standing on the head, the better, as it causes the whole packet of small intestines to hang, as it were, by the strangulated portion, and may thereby disengage it." At the time that this was written, it was a most

[1] The Chirurgical Works of Percivall Pott, p. 265.

valuable bit of advice: it was so anatomical and practical. But at the present day, when one does not temporise with a strangulated hernia, it comes in well in the treatment of a reducible but unmanageable one. And this is to be the prelude to direct treatment of the hernia, whether palliative or operative, and it is to be persevered in for weeks—many weeks, perhaps.

If the child is not actually hung up by his legs to the roof of a high bed-cradle, at any rate he must be so fixed and secured in his cot that his pelvis is well above the level of the rest of his trunk. An ingenious nurse will have no trouble in arranging all this to the comfort of the child and the satisfaction of the surgeon.

As a matter of fact, hanging a little child vertically, with the top of the head just touching the bed, is by no means a terrible position for him, and in the case of a strangulated hernia in a small child it should certainly be adopted, for after a very short while the hernia is almost certain to slip back. I have rarely found it fail. The child happily goes to sleep upside down, and, as Pott says, the steady drag of the packet of intestines pulls out the strangulated piece.

If in the case of an unmanageable inguinal hernia the child's pelvis has, in one way or the other, been kept elevated for some weeks, and the bowel has not once found its way into the funicular process, a truss may be applied, and it should be thus worn for some days, the child still lying in bed, and the truss and the child fitting themselves together and becoming used to each other. Then, gradually, the child may be allowed to assume again the erect position, and a little later to run about, being carefully watched the while. And perhaps after this the truss may be found to keep the rupture up perfectly well.

What I wish to insist upon is this, that if a child has a reducible hernia which is for ever coming down, and, perhaps, filling out the scrotum to the size of a man's fist, or even worse, he must at once be put to bed with his pelvis raised. If the surgeon is contemplating an operation for the case, this postural treatment is all the more advisable, for, without it, the best planned operation is apt to prove a failure. The expulsive efforts of a little child with a large hernia are

remarkably strong, as may be proved by the surgeon placing his fingers over the inguinal canal when a ruptured child is screaming, and omentum or bowel which has been accustomed for many weeks to find in a certain part of the abdominal wall an easy means of escape in time of pressure, will insist on its rights. The case is somewhat like that of a private landowner suddenly refusing to his neighbours a public right of way across his grounds, the result being that his offending barriers are treated with scorn, and the passage is once more opened up.

The great cause of trouble in dealing with a congenital inguinal hernia (and this is the commonest kind of hernia met with in children) is that a well-lubricated serous tube is opening out of the lower part of the abdominal cavity, and is, apparently, offering an irresistible attraction to an equally well-lubricated tail of omentum or piece of empty bowel. And a hernia having once slipped down into the tube, Nature seems to be frightened away from finishing off the small but important work of obliteration which she ought to have accomplished at the end of fœtal life. And thus it comes about that, though there may be apparently a cure of a congenital hernia by the persistent use of a truss in childhood, a rupture may without any warning make its unwelcome appearance long after childhood. A hernia thus suddenly coming down when a young adult—an athlete, maybe—is undertaking some violent exertion, is almost certainly of the congenital variety, and, if strangulation takes place at the same time, the symptoms may be alarmingly acute. Therefore, it is of the greatest possible importance that a boy's hernia should be actually *cured*—that is, that the funicular process should be safely shut off from the peritoneal cavity, and that his inguinal canal should be securely closed. The surgeon tries his best to bring this about by means of a well-fitting truss, the pressure of the pad gently worrying the serous tube until it determines the deposit of enough plastic exudation to cause the opposed sides to stick close together. But, unfortunately, he cannot be *sure* that this obliteration has taken place. And thus it comes about that many a young fellow who believes himself to be cured of his boyish rupture by the long and patient wearing of a truss, and has, perhaps under advice, for some

years left it off, may suddenly, under some violent effort, become the subject of a tight strangulation.

It is only by an open operation that one can be absolutely certain that the communication with the belly-cavity has been shut off, and it is on this account that one is sometimes the more inclined to advise operation. To illustrate the force of this remark, let one take the case of a boy of eight or ten years the subject of a congenital hernia. He has been wearing a truss from infancy, and has become so used to it that he could no more think himself dressed without its being in place than he could if he had not put on his trousers. The hernia had not been down for three or four years until eighteen months ago, when it slipped beneath the truss as he was climbing a wall. It was got back with difficulty. His external abdominal ring is larger on that side, but on coughing there is only a very slight impulse. He is going next year to a public school. His parents ask if it is advisable that he be submitted to operation? My answer would unhesitatingly be: "If he were my boy he most certainly would be operated on." An unobliterated funicular process is a snare of the utmost danger.

PREPARATION FOR OPERATION.

Preparatory to the performance of an operation, then, the child is to be kept for a time in bed with the pelvis raised. In this way, he learns, and perhaps for the first time, what restraint really means. The unruly child is, in his way, a little philosopher, and when he finds that he can no longer get what he wants by screaming, he submits with lamb-like resignation; and, for every reason, it is better that he should have his screaming out before the operation is undertaken.

The temperature is noted for a few days, so that it may be seen that he is not, by chance, sicking for some illness. And the skin of the inguinal region is duly got ready. Clearly, strong antiseptics cannot be used, and the customary carbolic compress must not be applied. A child's skin is delicate and permeable, and even a comparatively mild carbolic dressing may set up inflammation, or mortification, or may give rise to symptoms of general intoxication.

The inguinal region and the neighbouring parts must be thoroughly well washed with soap and water, and then covered with a boracic compress; they may also be gently treated

with turpentine, and may be given a final dabbing with a solution of biniodide of mercury of the strength of 1 in 4,000. And this should be enough. The room for the operation should be warm, and the child should be well protected from exposure by being carefully covered up before he is placed upon the table.

OPERATION.

The operation for the radical treatment of an inguinal hernia, consists of two essential parts. Of these the first, and, in my opinion, by far the more important, is the shutting off of the tube of peritoneum which, more or less, like a funnel, is inviting the descent of the bowel into the tunica vaginalis or scrotum. The second, and less important part, is the blockading of the inguinal canal by sutures.

I think it likely that if, in a hundred cases of congenital hernia, the opening of the funicular process of peritoneum were tied off, and nothing were done to the inguinal canal itself, but the wounds were closed by sutures and the child were kept flat for a month or six weeks, ninety-five of the cases would be perfectly cured. It is to safeguard the other five cases that sutures are placed in the inguinal canal. Mitchell Banks, as I shall note directly, did not put sutures into the canal, but merely brought together the pillars of the external ring by three silver points.

The incision should not be made through the scrotum, as it is difficult to render, and to keep, the skin of that region aseptic, but it should be placed over the lower part of the inguinal canal and the external abdominal ring. The intercolumnar fibres are exposed by using the forceps and the steel director. The lowest part of the intercolumnar fascia being then traversed, the looped muscular fibres of the cremaster are parted asunder, and the transversalis fascia (which probably is not recognised) is divided. Then the surgeon pulls up a loop of the bulky spermatic cord, and looks for the funicular process of peritoneum or sac.

Personally, I prefer to have the hernia down when I am going to operate. But it often happens, as the result of the child having been kept for some days in bed, and of the nurse having pushed upon the hernia as she prepared the inguinal

region for operation, that no trace of hernia or of sac is discoverable when the incision is made.

If neither hernia nor sac is down at the time of the operation the surgeon may ask the anæsthetist to let the child "come round" a bit, and, at the same time, he tells his assistant to press upon the abdomen, and then, either as the result of the pressure, or of the child straining, the hernia pushes its way down and reveals the sac. Either with or without external aid, the sac comes into view; it is recognised by its lateral border being free and whitish; there is no mistaking it. It is then separated from the elements of the spermatic cord right up to the top of the inguinal canal, well pulled down, and then tied. The surgeon need not open the sac, but he must assure himself, by gently pinching its neck between his finger and thumb, that for certain it is empty—of this there must be no mistake—and then, having tied the neck, he must cut off the sac a little lower down and remove it, or as much of the funicular process of peritoneum as he thinks desirable.

If he has pulled the sac well down before tying it, as soon as he lets go the stump it will slip up out of view. It should be so tied that it will leave no trace of a tube, depression or dimple in its peritoneal aspect, as in Fig. 1.

Fig. 1. *Sac tied up high so as to leave no peritoneal dimple.*

Fig. 2. *Sac not tied flush with peritoneal surface, the result being that a dangerous pit is left upon the abdominal aspect.*

But, if the surgeon has not pulled it down, he probably has not tied it at the very top, and then there would be a risk of a pit or dimple being left, as in Fig. 2, which the omentum or

bowel might regard, as it were, as a further invitation to descend.

If there is any possibility of doubt as to the sac being empty, the surgeon should of course open it, and pass the tip of his finger up into the abdominal cavity. But if, as I have said, he is quite sure about its being empty, he may tie it, unopened.

I am satisfied, however, that he ought not to try to obliterate the neck of the sac by twisting it—as he may be in the habit of dealing with another serous tube—an artery. If he does this, it is just possible that in making the last turns he may catch up also, and twist, a piece of omentum or even a piece of bowel. It is as unsafe to twist when one cannot see, as it is to tie where one cannot feel.

In tying the neck of the sac the surgeon must be careful not to catch the vas deferens in his ligature, for a loop of the vas is more than likely to be in the way just there. One further caution concerning the vas—in the child it is a very delicate structure, and when the surgeon is separating the sac he must handle the tissues gently or the vas may be broken. This separation of the funicular process, or sac, is not always an easy matter.

The second part of the operation consists in stitching up the inguinal canal. When I have asked a candidate, in an examination, to describe an operation for the radical cure of an inguinal hernia, he has almost always said, "I should do Bassini's operation," just as when he is asked about an amputation in the leg, he replies, "I should do a Teale." He likes to have his knowledge pigeon-holed and labelled, and he is very partial to knocking an examiner down, as it were, by quoting the name of some surgical authority; it seems to place him at once in a safe position. I doubt, however, if, in actual practice, he would "do a Teale," and I hope that, in the case of the hernia, he would not "do a Bassini," as there are serious disadvantages in connection with this method. Bassini begins his operation by what I would venture to call a needlessly long incision over the course of the inguinal canal, and having exposed the aponeurosis of the external oblique, he rips it up and turns flaps of it inwards and outwards so as fully to open up the canal in its entire length. Having secured the neck of the sac, he

lifts up the spermatic cord, and stitches the lower part of the internal oblique, or the conjoined tendon, to Poupart's ligament behind the cord, thus leaving the cord in front of all of that part of the internal oblique and transversalis in an altogether unnatural manner. In my opinion, another serious objection to Bassini's operation is the needless hurt done to the aponeurosis of the external oblique. I will picture a hundred young surgeons performing this operation upon an equal number of boys with reducible inguinal hernia, and then, in trust and confidence, repairing with needle and silk the damage which they have done to the divided and reflected aponeurosis. And I will ask if, in all these cases, their confidence will be justified. I should think it likely that in at least five of the cases there will be a failure, the hernia bursting through the patch and a worse rent being made.

Primum est non nocere, which in this instance may be translated, "If you are about to operate for the cure of a reducible hernia, for goodness' sake make it quite certain that the rupture is not rendered worse by your procedure." And if you are going to make a long incision, and are going to cut through the aponeurosis of the external oblique for the whole length of the canal, as if it were a tissue of no particular consideration, the rupture may possibly come down worse than ever. An operation does not always turn out just as it ought to do; and if, for one reason or another, the stitching in the external oblique aponeurosis does not hold, how great may be the failure!

The operation which I am in the habit of performing is a good deal like that of Mitchell Banks (of dear memory), except that I pass sutures deeply through Poupart's ligament and the muscular inner wall of the inguinal canal, so as to bring them, and keep them, in permanent contact. Banks was satisfied with pulling only the pillars of the external ring together, and he did not believe in effecting its permanent closure thereby. He did not believe such a thing could happen, any more than that the edges of a cleft-palate would adhere by being drawn together without his first "rawing them."

I am fully satisfied, however, that, when stitches are passed through aponeurosis, muscle-fibre and conjoined tendon, and

the parts are dragged together and so kept together, they do solidly and permanently adhere. The stitches cause the deposit of a large amount of plastic exudation, which in due course becomes fibrous tissue and makes a splendid barrier. Sometimes, after thus operating, the position of one or two of these deep stitches is shown by plastic deposit which may be so abundant that the surgeon wonders if it is going to break down and melt into an abscess. But the tenderness and swelling gradually pass away, and a firm and useful thickening remains to barricade the canal.

The neck of the sac having been tied and cut, and the stump having been drawn up out of sight, I thrust the end of my left index finger up the canal, that is, beneath the cremasteric fascia, and, of course, beneath the network of fibres which thinly cover in the triangular gap between the pillars of the external abdominal ring. The finger lies beneath the lowest part of the internal oblique (with which the cremasteric fascia is continuous) and beneath the arched border of the transversalis muscle. It lies also beneath the transversalis fascia. The back of the finger thus passed up the canal is resting upon the spermatic cord and keeping it out of harm's way. To the median side of the finger are the parts of the internal oblique and transversalis muscles already blended to form the conjoined tendon, which, had it not been for the vigorous pushing of the hernia, should be lying behind the inner part of the external abdominal ring.

With the left index finger, then, in the canal, in front of the cord, I thrust the end of an unarmed (blunt) aneurysm needle through the external oblique on the outer side of the external abdominal ring at the spot marked A, in Fig. 3. To reach the finger the needle is made to traverse also part of the muscular origin of the internal oblique ; then, still guided by the front of the finger, it is made to pass through the three flat muscles upon the inner side of the top of the ring, at the spot marked A'. A strong suture of silk, or of silkworm gut, is then run through the eye of the needle, and is withdrawn. Having thus been placed in position, its ends are caught together in clip-forceps until the time arrives for the suture being tightened up.

As a rule, two stitches are enough for closing the upper

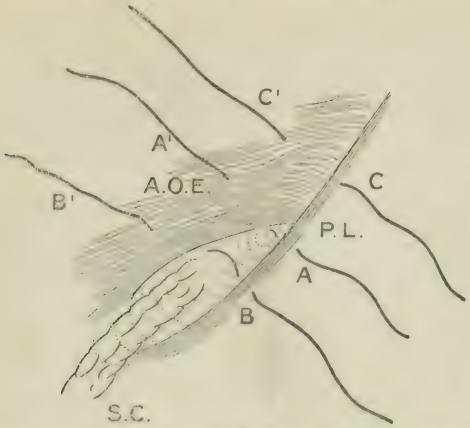

Fig. 3. *External abdominal ring with three sutures passing through (P.L.) Poupart's ligament and (A.O.E.) aponeurosis of external oblique. (S.C.) Spermatic cord covered by looped fibres of intercolumnar fascia, shown by dotted lines. It is noticed that the two highest sutures are above the top of the ring in a weak spot, and that the sutures enter and emerge at various distances from the ring so as not to take their bearings on the same bundles of tissue.*

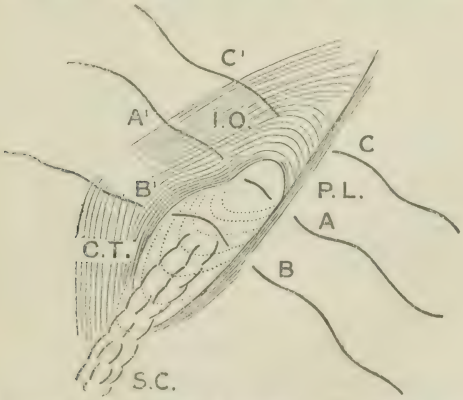

Fig. 4. *External oblique removed to show (I.O.) internal oblique with (dotted) cremasteric loops. C.T.—conjoined tendon; P.L.—Poupart's ligament; S.C.—Spermatic cord.*

part of the inguinal canal and external abdominal ring. There must be space left at the lower part of the ring for the free return of blood by the spermatic veins. The stitch, B, B′, comes up through the conjoined tendon. By pulling upon these stitches at the same time, with the tip of the finger still in the canal, it is at once seen if they will suffice to lace up the canal.

In those cases in which there is a linear weakness in the abdominal wall, as shown by a bulging of the aponeurosis in a direction upwards and outwards from the highest part of the external abdominal ring, it is advisable to begin by thrusting the index finger high up the canal, and inserting an extra suture above the canal, as shown at C, C′. Sometimes two of these extra stitches seem to be wanted. (Fig. 4.)

The stitches are then firmly tied in order from above downwards, and, as this is being done, it is clearly felt by the finger that the sides of the canal are being thoroughly well brought together over the cord.

In the simple operation here described there has been no dividing of any deep layer in the abdominal wall, but, on the other hand, the various untrustworthy tissues have been laced and braced together so that they may be enabled to form a solid barrier against a descent of hernia. *Primum erat non nocere*, and surely the boy could not be *any the worse* for the procedure.

It is the operation which I have performed for a good many years, and no doubt many other surgeons also employ it. My experience is that, if a radical operation for hernia does not turn out a success, the surgeon most probably hears of it. Like certain other unpleasant things, failures in radical "cures" come home to roost, and, without attempting anything like a "table of results" for my operations, I shall content myself with saying that I believe them to be quite satisfactory.

HOW DO THE STITCHES SERVE?

Banks, as I have said, put three wire stitches into the external oblique aponeurosis, not with the idea of getting the pillars of the ring to unite, but to prevent the hernia descending, and so that "the inguinal canal may have a

chance of contracting." In short, he used the sutures much in the same way that a farmer puts a hurdle in a gap in the hedge to stop the sheep getting through whilst the quick-sets are growing. But the stitches, as I have suggested, do much more than this.

AFTER-TREATMENT.

In the early part of last year I operated on a boy who was brought up from school for the purpose, and, before the operation, his mother asked me with great insistence not to be in a hurry to get the boy up on his feet again. She said that she would prefer to give him a week or two longer on his back than let him run the least risk of his rupture coming down again. It would have been unwise of me to take any other course in regard to this very practical request than heartily to fall in with it. I told her that, as a rule, I kept a boy three weeks in bed and three weeks on the sofa before letting him run about. She asked me to make it four weeks each way with her boy, and this I arranged to do. In hospital work, one could scarcely have fallen in with such a request, so great is the demand upon the beds. Indeed, I cannot help thinking that in the endeavour to pass as many patients through our wards as possible in order—well, I will say briefly, for financial reasons, the risk might arise of not allowing cases of radical operation to be kept flat for a sufficient length of time. But I freely admit that I have never known the fear realised.

Lastly, as regards the wearing of a truss after the operation, I do not hold any strong opinion. But, as a rule, I advise that the boy wear his old truss for a few weeks if it is not too strong in the spring. It acts as a sort of "reminder" to him that he is not yet strong enough to bear all the strain which, in his boyish, thoughtless way, he might be apt to put upon it.

CEREBRAL MANIFESTATIONS OF HYPERTONUS IN SCLEROSED ARTERIES.

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Notwithstanding the large amount of attention which has been bestowed on the pulse, there are still points concerning the interpretation of its manifestations in at least some common morbid conditions which require revisal. To undertake this, with any prospect of success, it is essential that the terms used should be unambiguous, and should convey a clear picture to the minds of those who are being addressed. In this paper the condition of the arterial wall is to be considered from the clinical standpoint; or, to put it in other words, it is proposed to point out the amount and kind of assistance which can be gathered from the recognition, and the correct interpretation, of the changes which are frequently present in the arteries of our patients. No doubt the condition of the arterial wall is, consciously or unconsciously, a factor in the estimation of the character of the pulse; but there can be equally little doubt that the arterial wall, and the blood stream within it, are not always considered separately, as they require to be if the full measure of assistance is to be obtained from "feeling the pulse." The condition of the arterial wall can, and often does, mislead in the all-important estimate formed from the pulse of the strength of the organ at the centre of the circulatory system. However much of a commonplace this may appear to be, it is necessary to remind ourselves that "feeling the pulse" has this fundamental object for its warrant; and that any failure to estimate the condition of the *blood stream* aright leads to an incorrect estimate of the condition of the heart. The possible gravity of such an error need not be enlarged upon. When such an error does occur, it is usually the condition of the arterial wall which has misled the observer. At the outset, therefore, it is necessary to keep apart in our minds the two factors, namely, the arterial wall and the blood stream within it. The condition of the blood stream is

determined by the driving power of the heart, and is, therefore, synonymous with blood pressure. The estimation of this owes its difficulty to differences in the size of the radial artery, which is the vessel commonly examined, and also in the thickness of its wall. Practically it comes to this, that the finger has to be trained to estimate pressure in a tube of varying size, with a wall of varying thickness. This aspect of the pulse has not had the consideration given to it which is necessary for the obtaining of all the assistance it is possible to get from "feeling the pulse."

The arterial wall consists of three coats; but, notwithstanding this, an artery such as the radial, is, in its normal condition, so thin and soft-walled that, when dissected down upon after death, the finger may not feel it, and, even with the aid of the eyes, there may be doubt as to whether it is the artery, or its accompanying vein, which has been found. As life advances changes take place in the arterial wall in the majority of persons. The change is a thickening of its walls. The middle coat of such arteries as the radial is a muscular coat, under the control of the vaso-motor nerve mechanism: it has not only the property of rhythmic contraction, harmonising with the propulsion of blood into the arterial system, but it has also the power of hypertonic contraction and of spasm contraction, induced by conditions in the blood, or produced by the direct action of the vaso-constrictor fibres of the sympathetic which supply it.

The structural changes which occur in the arterial wall have three names applied to them—(1) atheroma, (2) arterio-sclerosis, and (3) calcareous degeneration.

Atheroma is a term of old standing in this country. It has long been applied to areas of thickening of the arterial wall characterised by thickening and degeneration of the tunica intima, usually associated with atrophy of the tunica media. The atheromatous patches may become infiltrated with calcareous material, making the arterial wall hard and rigid where it occurs. The term has been widely used in this country to designate *all* thickenings of the common artery of clinical observation, the radial.

The term *arterio-sclerosis* is of more modern origin, and to a certain extent it has displaced the older term. It is

widely used to designate all thickening and hardening of the arterial wall, including atheroma. If names and appellations were merely words for definite things, there would be no need to cavil at them; but in medicine names often lead to confusion of thought, and therefore to inaccurate clinical observations and deductions. And this, I venture to hold, is very applicable to "the pulse" as manifested by the radial artery. The term "atheroma" is an excellent one for the pathological change to which it was applied; an error, however, was committed when it came to be applied to all the thickenings of the radial artery noted clinically. True atheroma is a relatively rare condition in the radial arteries, whereas thickening is exceedingly common. The term "arterio-sclerosis" ought to be confined to this common thickening, as I have elsewhere proposed.[1] It presents anatomical and clinical features which quite definitely separate it from atheroma. Clinically, arterio-sclerosis is characterised by a *uniform* thickening of the artery examined, whether it be the radial or the temporal. It is not a patchy thickening, as occurs in atheroma. The thickening is made up of a thickening of the muscular coat, and of the tunica intima, the former being primarily a hypertrophy. Arteries thickened in this way have not lost their power of contractility; on the contrary, they are fully more sensitive to some, at least, of the impressions to which arteries normally respond. This retention of contractile power is a point of great clinical importance, as will be presently shown. It is a fact which is often not observed, for it is obscured by the idea that "atheroma" causes rigidity of the arterial wall. So atheroma does, but, as has been stated, this is not atheroma, and all preconceived ideas regarding atheroma have to be discarded if arterio-sclerosis is to be correctly understood.

The further fact has to be noted, namely, that, while *calcareous degeneration* occurs in atheroma, it does not follow that calcareous radial arteries are atheromatous. It not infrequently happens that the calcareous degeneration is an infiltration of the tunica media, not of the intima. In what proportion of cases this latter condition occurs I cannot say, but certainly more frequently than is generally supposed, and than is commonly taught.

Having thus indicated the character of the changes in arterio-sclerosis, and that the sclerosed vessels retain their power of contractility, we can now consider the clinical manifestations and some of the effects produced by these two factors when they operate together.

Thickening of the radial arteries is readily recognised by the finger. The degree of thickening varies in different persons, while some measure of thickening is so common that it is almost universal after middle life. It is, however, far from being rare in the earlier years of life. While the thickening is common and easy of recognition, it always presents the fundamental problem:—How much of it is due to permanent tissue increase, and how much to an excess of the normal tonic contraction of the muscular coat, that is, to *hypertonic contraction?* The practical bearing of this question is that, in so far as the thickening is hypertonic, it can be removed; while, in so far as it is structural, it is permanent. Up to early middle life it is safe to assume that the thickening is but to a slight degree structural.

The conditions which produce hypertonus and lead to arterio-sclerosis I have dealt with elsewhere.[2] Here I may make the general statement that deleterious substances of various kinds present in the circulation, produce hypertonic contraction of the arterioles. These deleterious substances may be retained as a result of renal disease, or renal inefficiency; or they may have been absorbed from the gastro-intestinal tract, having no deeper origin than constipation, with putrefactive decomposition of proteid in the intestine. The cause does not always, or indeed commonly, belong to the more subtle of the chemical processes in the body. Hypertonus can be accurately, although broadly, defined as due to toxic absorption, or to defective elimination, or to the two combined. The effect of kidney disease in reducing elimination of waste substances, produced in the course of ordinary metabolism, is the most outstanding example of the one condition; while the effect of a proteid diet, digested and absorbed, on kidneys not able even to remove the minimum of nitrogenous waste, is equally well known, and the knowledge is given practical expression to in the diet prescribed to persons suffering from renal disease.

Having thus very briefly, but I hope sufficiently clearly, indicated the meaning I attach to the terms arterio-sclerosis and hypertonus, and also indicated one great cause of hypertonus, I may now proceed to develop the special aspect of these changes which I am to deal with here.

In this paper I confine myself to the consideration of some of the clinical manifestations of hypertonus in vessels already sclerosed, and, as sclerosis is more common after the age of 40 than before that age, and becomes more marked as age advances, the manifestations here dealt with occur in the latter half of life. It must, however, be insisted on that the third and fourth decades of life are not exempt from a measure of sclerosis; but frequently what, during these periods may be regarded as sclerosis, is shown, by the result of treatment, to have been hypertonic contraction.

Confining ourselves to the nervous system, what may be regarded as the most striking cases may be considered first. These are cases in which paralysis suddenly occurs. When detailed enquiries can be satisfactorily made, it is often found that there has been slight indisposition for some days before the advent of the paralysis; whilst in other cases no deviation from the average health has been observed. The paralysis may be a hemiplegia, a monoplegia, or an aphasia. It may come on when the patient is sitting quietly in a chair, or moving about the house, or walking out of doors, or when in bed, and may only be noticed on awakening from sleep. There is no loss of consciousness. If the seizure comes on when the individual is moving about, he or she collapses if the leg is affected suddenly; while if it comes on more gradually, the sense of weakness will lead the person to sit or lie down on the nearest practicable resting place. The diagnosis in such a case lies between hæmorrhage into the brain, or the cutting off of the blood supply from the motor strand in the brain. Hæmorrhage is excluded by the absence of any loss of consciousness. The question is thus reduced to a consideration of the causes which suddenly cut off the blood supply, and these are three in number—embolism, thrombosis, and hypertonic contraction or spasm. Embolism only occurs where there is valvular lesion of the heart, or advanced disease of the aorta; and even in these, cerebral embolism is not very common,

and when it does occur, the block is likely to be in a larger vessel, and the symptoms correspondingly more severe, with some obfuscation of the mental faculties. In many cases the diagnosis is between thrombosis and hypertonic spasm. Thrombosis as a cause of such symptoms is fully recognised, but hypertonic spasm as the cause is not so universally known. Thrombosis is specially prone to occur in atheromatous cerebral arteries, more particularly when the driving power of the heart is diminished, and the current through the diseased vessel is correspondingly slowed. That such paralyses as have been mentioned may be, and often are, due to spasm contraction or hypertonic spasm of sclerosed vessels in the brain, is the fact on which I here specially desire to lay emphasis. It is not commonly known, and therefore cannot be recognised. When the condition of the vessel wall in sclerosis is borne in mind, and when it is recognised that sclerosed vessels can become markedly contracted, so as to greatly diminish, and probably even practically obliterate, their lumen, it is evident that the condition can as effectually interfere with the nutrition of the portion or portions of brain supplied by such arteries as if they were occluded by embolism or by thrombosis. There is, however, this great practical difference, that, whereas the two latter conditions are permanent, the first-mentioned condition may be transitory, and can to a very important degree be influenced by treatment. If it is recognised early, treatment may be the means of preventing a degree of tissue degeneration too great to be recovered from. The degree of spasm in the cerebral arteries varies; in some instances it merely impoverishes the blood supply to the part, so that in motor strands it only leads to paresis—enfeeblement without complete loss of motor power. It may, however, be much greater; but it is probably only in exceptional cases that the spasm so contracts the vessel, and diminishes its lumen, that even the plasma of the blood can no longer pass along it. If brain tissue is completely deprived of nourishment it perishes in a very short time, while, if it is only rendered ischæmic, its functional activity is lowered, but the tissue does not become irremediably destroyed. The varying degree of spasm is the explanation of the fact that in some instances there is paresis, and in others complete paralysis. In addition to the degree of spasm contraction in the

artery, another factor, however, shares in determining the degree of suspension of function in the particular portion of brain influenced. That factor is the power of the left ventricle. If, in addition to spasm contraction, there is a feebly acting ventricle, the circulation in the part is necessarily more reduced than if a vigorously acting heart is successfully impelling blood through the narrowed vessel. These two factors, and the recognition of the true condition of the heart, in each separate case determines the appropriate treatment of each individual patient.

The diagnosis of the condition is made, partly by a process of exclusion, but mainly by positive signs. Hæmorrhage and embolism can be excluded on the lines already indicated. Thrombosis occurs commonly in atheromatous vessels with weak or fatty heart. Hypertonic contraction and spasm occur in sclerosed vessels, and are as common with a heart of good power as with a feeble one. The hypertonus can be recognised in the radial and other arteries. Common causes of hypertonus may be brought out in the patient's history, such as a dietary too full of proteid, or of meat soups, constipation with proteid putrefaction in the intestine and auto-intoxication, or exposure to cold.

I may mention very briefly a few cases illustrative of the preceding contentions, and I place first a very striking example of the condition in an old hemiplegic.

Case: J. B., aged 58, has been an inmate of Queensberry House for years. He walks about dragging his right leg, with the right arm in an analogous condition, while the speech is thick in utterance, and limited in its range of words. A few months ago, on being informed that he was ill, I saw him, and was surprised to find that he had completely lost the power of his disabled side. He was unable to get out of bed, for he could not move either his right leg or his right arm; while, in addition, he was completely aphasic and could only grunt in response to questions. He was perfectly conscious, and indicated in various ways annoyance at his helplessness and at his loss of speech. On feeling his pulse, I was at once struck with the marked hypertonus it displayed, while the heart was acting vigorously. He was ordered a gentle aperient and a mild vaso-dilator. He had improved the following day.

and two days later he had regained his former power of locomotion, and of speech; the symptoms disappearing as his radial arteries relaxed. There is no doubt that the clinical pathology of this interesting case was, that the sclerosed arteries of the damaged portion of brain had become contracted sufficiently to lead to total suspension of function. He was seen early, and treated promptly; arterial spasm was relaxed, the damaged brain again received its ordinary supply of blood, and function returned, without a trace of further injury having been caused by the attack.

Other cases are much less striking than this one.

Case: Mrs. M., aged 60, was seen with Dr. Harvey. In this case there was a hemiparesis which had come on suddenly when the patient was in bed. There was marked arterio-sclerosis, but the radials seemed to be unduly thick for their size, and I had no doubt that they were contracted hypertonically. I advised treatment directed to the removal of the hypertonus; this was carefully carried out by Dr. Harvey, and I learnt afterwards from him that my anticipations had been fully realised, and that recovery had taken place with the relief of the hypertonus.

Case: Mrs. W., aged 40, was seized on her way from church, and had to be assisted to her home. She had right hemiplegia and aphasia, but was quite conscious. I saw her with Dr. Richardson, and found that there had been a long period of somewhat poor health, with digestive feebleness and prolonged constipation. She had the appearance of a person of this type. She had no heart lesion, and no kidney trouble. The radials were markedly contracted, but evidently without much thickening of a permanent kind. She was carefully dieted, in fact, for some time she was kept on milk, and measures were used to counteract the arterial contraction. In the course of some weeks she gradually regained the power of her limbs, and after a longer interval she lost nearly all trace of speech impediment.

These cases illustrate a common type. Another type is characterised by sclerosis associated with atheroma and calcareous degeneration. In cases of this type the heart may be fairly vigorous, at all events there may be no signs of failure on the part of that organ. In such cases hypertonus

occurs without any lowering of the heart's power, and, when this takes place, there is imminent risk of a degenerated and weakened part of an artery giving way under the increased pressure to which it is subjected. This is the sequence of events in many cases of cerebral hæmorrhage. When the combination of arterial changes mentioned is present, it becomes a matter of continuous concern and constant management to control the tendency to hypertonus, while not allowing the heart's action to become too feeble. I can recall the case of an old gentleman with such a circulatory apparatus as is here indicated who was advised to take a little whisky daily. He felt benefited by it for a time, and continued it, with the result that his sclerosed vessels became hypertonic, his heart was also stimulated, with the result that he very shortly had a fatal cerebral hæmorrhage. In other aged people I am constantly impressed by the fact that freedom from cerebral symptoms corresponds with an absence of hypertonus, and that the prolongation of life results from the avoidance of the causes which induce hypertonus.

While such cases as the preceding illustrate the more serious effects produced by hypertonus, there are other cerebral symptoms resulting from it which, while less grave in themselves, are to be regarded with anxiety, and demand careful attention if further developments are to be prevented. Among such symptoms are vague pains in the head, or attacks of giddiness or a combination of these. I have recently seen two patients, aged 60 and 65 respectively, the younger of whom complained of giddiness, and the elder of pains in the head. The younger man had the thickest temporal arteries I have ever seen, the other had also markedly sclerotic vessels. They were both vigorous and healthy-looking men for their years. They were both much relieved by measures adopted for the relief of their hypertonus ; and, in the older man, I was struck by the reduction in the thickening of the radials under treatment, showing that a considerable degree of it, notwithstanding his age, was hypertonic and not structural.

The last type of case to which I shall refer comprises cases of which I see a large number. The patients are all old people, and are of both sexes, more commonly, however, female. They have the characteristics which are commonly regarded as

inseparable from degenerated, senile arteries, physical feebleness, and deteriorated brains. Such persons from time to time are seized with restlessness, insomnia, mental excitement, which amounts, during the night, to a form of delirium. They will get out of bed during the night and wander about the room all night if allowed to do so, and do many strange and dangerous things, as lighting matches, and interfering with the fire. When an attack of this kind is on, I always find that their sclerosed arteries have undergone marked contraction. I have at present, in the male sick ward of Queensberry House, a very pretty example of this condition. The patient is a very old man, but usually quiet and inoffensive, sleeping well, and moving about during the day, giving no trouble to anyone. When the attack comes on he is as I have described. The striking feature, beyond the manifestations I have mentioned, is a remarkable contraction of his arteries. The radials, which are always somewhat sclerosed, but of good size, with a fair volume of blood in them, become reduced by contraction to half their ordinary size or even less. The infallible remedy for these attacks in this old man is a dose of paraldehyde. If this is given at night he sleeps quietly, and next morning his arteries have returned to their ordinary condition. With a few days of very low diet, and sometimes a second dose of paraldehyde, he returns to his ordinary condition. No other hypnotic or sedative has the effect upon the man's arteries that paraldehyde has, and no other has any beneficial effect upon his attacks. This drug does not have a corresponding effect upon all such cases. In other cases the hypertonus which leads to the insomnia and restlessness can be counteracted by means of laxatives, or by sulphonal, trional, veronal, or phenacetin, or by a combination of two of these. The explanation of arterial contraction causing this train of symptoms is to be found in the anæmia of an enfeebled and degenerated brain—the anæmia being due to the vessel constriction ; and the symptoms disappearing as the constriction is removed.

I have thus sought to illustrate my contentions regarding hypertonus by reference to three classes of cerebral manifestations. In concluding I may add a few sentences with special reference to treatment. Some points I have already referred to. The treatment to be successful requires a complete

understanding of the state of the circulation in each individual case. The general principles are easily stated. If there is hypertonus it ought to be carefully relaxed, the effect of whatever drug is used being carefully watched. If the cause of the hypertonus is known, it can be removed or lessened. If the hypertonus occurs with a good acting heart there is greater scope for treatment. If the heart's action is feeble the effect on the heart itself of the vaso-dilator to be used has to be considered; and it has to be further considered whether you are to stimulate the heart while relaxing the vessels. If a small hypertonically contracted radial artery is regarded as the feeble pulse of a weak heart, measures are apt to be taken which are almost certain to be disastrous. Beyond these generalities the treatment can hardly, I think, be usefully dwelt upon.

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[1] "Arterial Hypertonus and Arterio-sclerosis; their Relations and Significance," *Lancet*, June 1, 1901; *Transactions Medico-Chirurgical Society Edinburgh*, Vol XX., 1909, 1901; *Encyclopædia Medica*, Vol. XIII., Article "Vessels."

[2] *British Medical Journal*, June 4, 1904, "Arterial Sclerosis and Hypertonus in their Relation to Diet and to the Digestive System."

THE CURRENT THEORIES REGARDING THE CAUSATION OF ARTERIO-SCLEROSIS.

II.

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[With Plates VI.—IX.]

In a recent number of The Practitioner[1] I reviewed at some length the various theories which are current at the present day with regard to the causation of arterial disease, but the conclusions, on the evidence adduced, were in many respects indefinite and unsatisfactory. I propose in this paper to detail the results of my own investigations into the subject.

It is somewhat difficult to account for the present situation, as so much material is available for investigation. The chronicity of the disease, however, and its varying relationship to visceral lesions, of which it is now the cause, now the result, have tended to obscure its etiology, and the bulk of observations have been made on fully developed cases in which symptoms have been clinically manifest. It is impossible to reconstruct, in every detail, the process by which the result has been obtained, as the causes have often ceased, sometimes for many years, to be in active operation. The question must be approached from another standpoint, and the early lesions, of no clinical importance, must be investigated. If this is done, the origin of arterial disease becomes more intelligible, although much further research is still required.

It has been customary to consider the arterial wall as composed of three layers, the intima, the media, and the adventitia, but while this is useful from the descriptive point of view, it is harmful, because it tends to produce the idea that, physiologically, the layers are distinct and separate, an idea which is essentially inaccurate. It is true that the internal elastic lamina in the smaller vessels marks abruptly the line of division between the intima and the media, but it is absent in the aorta

[1] August, 1905, p. 203.

and larger trunks, and the precise limits of the layers are, in consequence, indefinite. The muscular fibres are probably confined to the media alone, but the importance of this fact, even if it is accurate, has been over-estimated. In the smaller vessels, they form the main portion of the layer, but in the larger trunks they are relatively scanty, and the elastic fibrils are the essential elements. The two groups of vessels must be sharply separated. One group forms the "mains" for the supply of blood to the tissues, with a calibre proportionate to the amount of blood which they have to accommodate, and a structure adapted to resist the varying strain of the blood pressure. The second group constitutes the "supply pipes," with "taps" which can be partially closed, and so can re-arrange the distribution of the blood. The adventitia is but a part of the general connective tissue, and can seldom be exactly defined, and the connective tissue and elastic framework of the three layers are structurally in contact. Coats was correct when he said that the essential constituent of the blood-vessels was the intimal pavement endothelium.

Even, in the same artery, the relations of the three layers may vary in different portions of its course. Particular parts may be exposed to special stress, and the liability to damage at the part is to a certain degree compensated by special means. The upper wall of the ascending aortic arch, exposed to the full force of the ventricular systole, is much thicker than the opposite side where the systolic impact is less direct, and vessels are always thickened at bifurcations and around the origins of branches, in order to meet the extra strain. Arteries, such as the facial, superior mesenteric and brachial, are exposed to possible damage from the movements of the neighbouring parts, and in consequence have notably thick adventitiæ; others, such as the abdominal aorta and the nutrient vessels of the bones, are protected from such influences, and possess an adventitia of little thickness.[1] Even the relative proportion of the different elements of each layer may vary in different vessels of similar size. The media of the renal arteries, for example, contains a much larger proportion of muscle, and a much smaller amount of elastic tissue than such a vessel as the radial. And one cannot predicate what the exact constitution

[1] Ballance and Edmunds: *The Ligation of the Great Arteries*, London, 1891.

of an artery will be, since the individual elements may vary in their amount from its special function, or its special site.

The vascular arrangements of the arterial wall point the same moral. The nutrition of the vessel is subserved from two sources. The vasa of the adventitia penetrate for a certain distance into the media of the larger trunks, but under normal circumstances do not trespass far. The minute vessels have no vasa, and must be largely nourished by the blood within them, although no connection with their lymphatic spaces is apparent. It is difficult to estimate how much of the wall is supplied from each source. But in endarteritis the cells nearest the blood stream are always less degenerate than those farther away, and, in some cases of medial fibrosis, the innermost muscle cells persist, while those in the middle of the layer have disappeared, so that it seems as if, in abnormal circumstances, both media and intima may be nourished from the intra-arterial source. All the muscle cells, however, may be intact in cases of endarteritis, so that even the innermost layers of the media may in certain cases be nourished from without. It seems probable that, in normal circumstances, the medial source is mainly the vasa, and the intimal source the blood stream, and that, under abnormal conditions, a defect in one supply may be more or less compensated by the other. Newly formed blood vessels in the media and intima are always derived from the vasa.

The lymphatic flow, although no definite lymph vessels are present, takes place from within outwards. In early cases of atheroma, the muscle cells in the vicinity of the degenerate intima are not infrequently fatty, presumably as the result of the toxæmia.

The functional and structural arrangements of the arterial wall thus necessarily entail damage to more than one layer in all but the very slightest lesions, and, as a matter of fact, damage is rarely confined to one layer. *In advanced cases all the layers are abnormal*, though the degree to which each is involved may vary, and this occurs quite irrespective of the site of the initial damage.

Many writers, following Councilman, divide arterial disease into three main groups, the diffuse, the nodular, and the senile ;

but, as I have argued elsewhere, old age is not an entity of disease, and is not of itself the cause of damage to the vessels. During our lifetime, the arteries are exposed to many injurious influences, and, as years go by, these influences naturally become more numerous, but it is they, and not the years, which cause the lesions. Sometimes, as Professor Osler suggests, arterial disease seems the result of a congenital defect, the inherited quality of the vessels seems poor, and they, in consequence, "wear out" at an earlier period than in normal persons. Such a congenital group might perhaps be included in our classification, but its indefiniteness leads me to reject it, and I propose to divide arterial disease into only two main groups, the *focal* or *nodular*, and the *diffuse*.

I.—THE FOCAL LESIONS.

In this group, the lesions may be numerous and widespread, and may involve many vessels, but notwithstanding affect only a very small proportion of the arterial walls. Focal lesions are generally present in cases of diffuse disease, but the converse proposition does not hold true. Focal lesions are mainly confined to, and are most common in, the larger vessels, though the smaller ones are not exempt. The viscera are but seldom affected by the arterial disease; if they are involved, the lesion, which is found, is generally single, though perhaps of large extent, and is the result of occlusion of the vessel.

1. *Endarteritis Obliterans.*—The lesion known as Endarteritis Obliterans is met with in particular in the smaller vessels, and, although frequently of syphilitic origin, is not invariably the result of this infection. It is always local in its distribution, but, as the lumen of the artery is narrowed and sometimes completely blocked, its clinical importance is considerable. A case of tuberculous arteritis, secondary to a basal meningitis, illustrates the method of production. The artery in question was unequally involved in the tuberculous mass, and, while on one side the adventitia and media were caseous, on the other the media was almost normal, although the adventitia was involved. The intima was thickened generally, and was composed of a very loose connective tissue with many stellate and spindle-shaped cells. Its outer layers were infiltrated with small mononuclear cells, and were traversed by newly-formed

blood vessels, which originated in those of the middle coat. The intimal proliferation was clearly secondary to the tuberculous process outside.

Adventitial changes have always been extreme in the syphilitic cases which I have examined, a mononuclear cellular invasion and connective tissue hyperplasia being present in the early stages; in older examples, the connective tissue may be hyaline, and the nuclei scanty.

Endarteritis obliterans may be due to other infections than those alluded to. I have seen it in the aortic vasa after acute rheumatism, and it has been found in cases of diphtheria, scarlatina, small-pox, and enteric fever. And not only may it be met with in the infections, but it also occurs in arterio-sclerosis; arteries, presenting all the characteristic details, may be seen both within the kidney substance and without, though they are probably more numerous within the organ.

It seems sometimes, too, to follow mechanical interference with the normal supply of blood, such as may occur, for example, if the origin of a coronary artery is obstructed by aortic atheroma. The intimal hyperplasia may in these cases be extreme, and degenerative changes are usual, although the gross fatty and calcareous deposits of atheroma do not occur. It is to this group alone that Thoma's theories seem applicable. The alteration in the tension and the function of the artery is considerable, and the normal proliferative changes exceed the degree which is required.

(2) *Atheroma. Endarteritis nodosa vel deformans.*—Atheromatous patches are almost invariably found to be present in the arteries of elderly persons, though, of course, their number, size, and distribution vary in different cases. The patches are distinctly elevated above the surface, with edges which are more or less abrupt, and, even in small arteries, rarely involve the whole circumference. They differ greatly in size, being sometimes mere pin points, sometimes plaques as large as a shilling, and they may, by coalescence, involve comparatively large areas. Their colour is usually grey or yellow, although it may be white, if calcification has taken place. They are sometimes soft and gelatinous or translucent; more often opaque and firm. In old standing cases

ulceration is not uncommon, and thrombi, rarely of great size, may form upon them.

All observers are agreed that the first portions of the aorta are the parts which are most often diseased, but there is a difference of opinion as to the frequency with which the other arteries are affected.[1] The coronary arteries of the heart, the cerebral and the peripheral vessels are, however, affected more often than those of the viscera, while the pulmonary artery in particular is but seldom involved.

In advanced examples the changes are seen, on microscopical examination, to implicate all the thickness of the wall, though the degree to which each layer is involved varies in different cases. The *intima* is always thickened, often greatly, and in the early stages is very cellular, many spindle-shaped, stellate, and small round cells being scattered between the laminæ, while the lining endothelium remains intact. In the later stages, degeneration takes place, and hyaline, fatty, granular, mucoid, or calcareous changes may be found; and these are always most extreme near, but not necessarily next, to the outer margin of the coat. The elastic tissue shares in the hyperplasia, and numerous fine fibrils can be seen on appropriate staining, in recent cases, wavy and distinct, and most numerous along the outer margin, but, in older cases, granular and indistinct, and often broken up into little masses of varying size. Small mononuclear cells are often present in considerable numbers around the margins of the patch, if the degenerative changes are well marked. The *media* underneath is usually thinned, sometimes to a notable degree. The muscle cells are atrophied and scanty, and their nuclei are shrivelled and thin, and may stain faintly or diffusely. The connective tissue is generally excessive in amount, but the cellular elements are few, and the elastic fibrils are degenerate. The blood vessels, in some cases, are more numerous than usual, and may even penetrate for some distance into the intima. The *adventitia*, as a rule, is less abnormal than the other coats. In early cases it may be thickened and very cellular, and little collections of mononuclear cells may be visible here and there. In older cases, it may be distinctly sclerosed, with much hyaline

[1] Huchard: *Traité clinique des maladies du cœur*, Paris, 1899, Vol. I., p. 204.

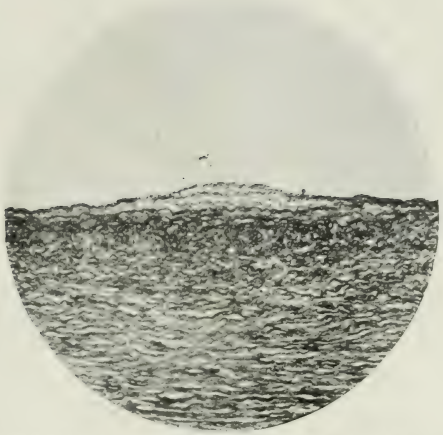

Fig. 1. *Early atheroma from the aorta of a girl who died, at. 22, from phthisis. The media is but little altered at the level of the intimal thickening (elastic stain).*

Fig. 2. *Vasa of aorta showing endarteritis obliterans. Note peri-arterial cellular collections.*

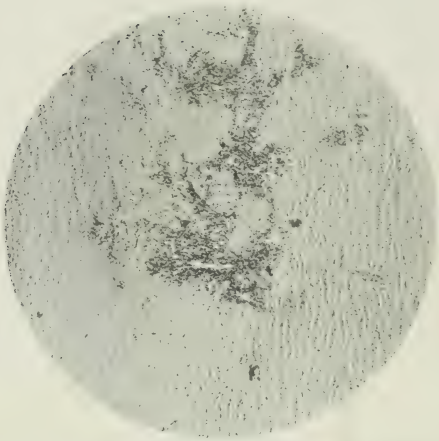

Fig. 3. *Necrosis of media. Patch of granulation tissue surrounding new-formed vessel.*

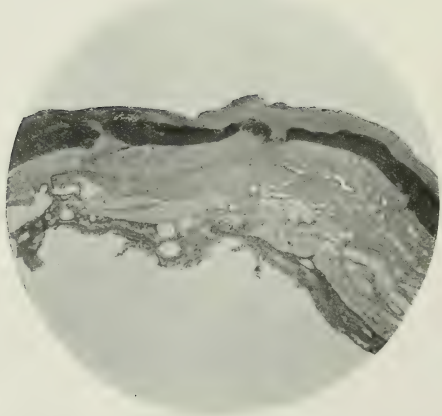

Fig. 4. *Section of aorta, stained to show elastic tissue. The media (thick black line) is atrophied, and here and there replaced by a very cellular granulation tissue (unstained).*

connective tissue, and many newly-formed but degenerate elastic fibres.

The picture as a whole gives the impression that the lesion is primarily intimal. The intimal changes are always the most extreme, and, in early examples, may be the only lesion.

The aorta of a girl, who, at the age of 22, died from acute phthisis, showed several minute elevations immediately above the aortic valves, and, for several inches along the posterior wall of the descending aorta, an elevated yellow patch with abrupt edges. Microscopic examination showed that the lesion was almost wholly intimal, the media at the centre of the patch showing only a slight irregularity and blurring of its elastic tissue (Fig. 1). The external coat was normal. The irritant, whatever its nature, must have originated from the blood-stream, and, in several similar cases, bacteria have been found in the intimal lesion. In the case narrated above, no evidence of tuberculous invasion was found, but, from the nature of the case, a toxæmia must have been present. In several other early examples which I have examined, medial changes were wholly confined to the innermost portions of the coat.

The intimal lesions, however, even though considerable, may be the result of adventitial damage. In a case where death resulted from rupture of a gastric ulcer, numerous large soft patches, evidently of syphilitic origin, were found scattered over the ascending and transverse portions of the aortic arch. The media at these places was notably thinned, while the adventitia was thickened and sclerosed. Most of the vasal arteries showed gross disease, by which their lumen was narrowed, the intima being universally thickened, the media atrophied, and the adventitia infiltrated by small mononuclear cells (Fig. 2); and larger collections of these were present here and there in the outer coat at some distance from the vasa. The *media* was greatly altered. Here and there little patches of necrosis were visible, and, in their vicinity, were many newly formed blood vessels surrounded by a very cellular granulation tissue (Fig. 3). The elastic tissue at these places was largely gone, and in their immediate vicinity granular and degenerate. The *intimal thickening* was considerable,

and degenerative changes had taken place along its outer margins.

The aorta of a man, who, at the age of 46, died from acute nephritis, showed, in the ascending and transverse portions of the arch many depressed cicatrices, a few small ulcers, covered with recent clot, and, in between, elevated patches which were sometimes calcareous. The *adventitial* changes in this case were very striking. All the tissues, even without the adventitia proper, were greatly thickened and infiltrated by a very cellular granulation tissue. The vasa were notably affected, and the mononuclear cell collections were sometimes of considerable size. The *media* was in places wholly gone (Fig. 4), being replaced by a vascular granulation tissue, which could afterwards be traced, running along the outer margins of the thickened and degenerate intima.

In these cases, the primary lesion was evidently adventitial. The interference with the vascular supply from the vasal vessels produced medial and intimal necrosis, and the granulation tissue invasion followed. Drs. Mott and Sumikawa have shown that local arteritis may be produced by irritation of the outer coat. They damaged the outer wall of an artery with caustics, and found that all the layers became involved.

Vasal changes may, in some cases, be the only visible lesion, the media and intima persisting intact. A man died, at the age of 32, having kidneys of the small white variety, a hypertrophied heart, and an aorta which, though elastic and supple, was considerably thickened. The muscular tissue of the aorta was uniformly fatty, a condition which was also present in the heart, but the intima and media seemed normal in every other way save for their hypertrophy (Fig. 5). The adventitia was not sclerosed, but both its arteries and veins, especially the latter, showed gross alterations (Fig. 6), and the usual mononuclear collections were also present. Such a condition must ere long have interfered with the nutrition of the inner and middle coats, and have led to local lesions in them.

Atheromatous patches may thus arise from both intimal and adventitial disease. In some cases of tuberculous arteritis secondary to tuberculous foci in their vicinity, the process may be seen to spread from without inwards, so that both forms may be due to bacterial infection. And, even in cases where

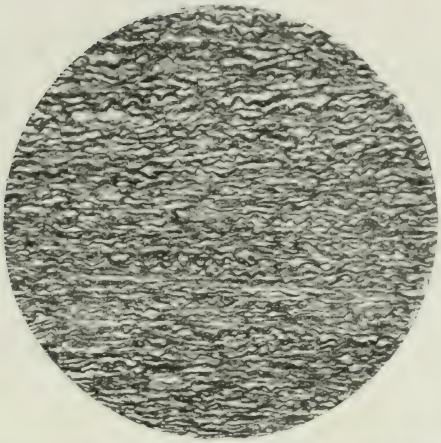

Fig. 5. *Elastic tissue in the media of the aorta of a man who died, at the age of* 38, *with small white kidneys.*

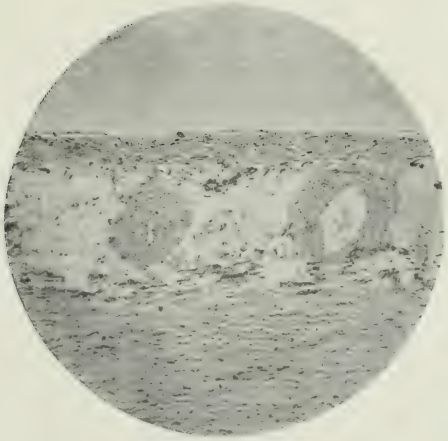

Fig. 6. *Vasa vasorum of aorta of* Fig. 5.

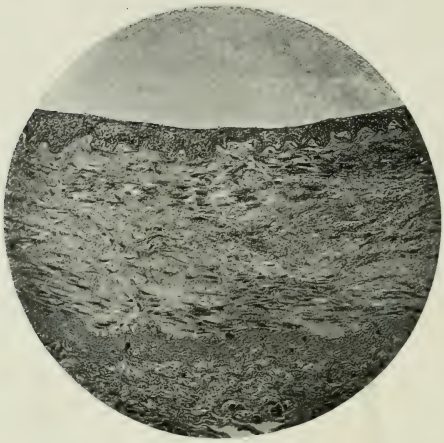

Fig. 7. *Fibrosis of media of renal artery from a case of granular kidney. Note persistence of muscle along margins of media.*

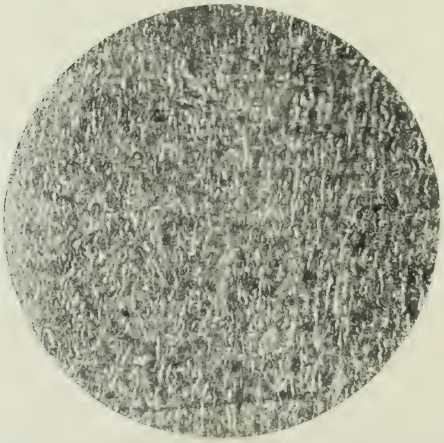

Fig. 8. *Elastic tissue in media of aorta of a girl who died, æt.* 23, *of phthisis. Contrast with Fig.* 5.

no bacteria are demonstrable, the possibility of such an origin must not be overlooked. The granulation tissue of tuberculous joints, for instance, only rarely shows bacilli, though no one doubts the relationship, and the scar of a healed lesion may be the result of many different injuries, although no evidence of the original cause can be traced. I do not think, however, that it is necessary to assume that every case of atheroma is due to actual bacterial infection, or a bacterial toxæmia. It is true that most people of 50 years of age have suffered from one or more of the acute affections, and have consequently been exposed to the risk of septicæmia, but similar results may obtain from intoxications of other nature. There is now a fair amount of evidence, which shows that focal lesions may result from intoxications of diverse kinds. Some of these are the result of gastro-intestinal derangement ; others are the direct effect of the ingestion of poisonous substances, such as lead, xanthin, suprarenal extract, &c.

It seems also probable that focal lesions may originate in the middle coat, although the evidence on this point is somewhat incomplete. The pulmonary artery of a patient, who died from chronic valvular disease, showed some small patches of atheroma. Microscopic examination showed that *all the coats were thickened*, the media showing the greatest alteration. The elastic tissue was in great excess, and somewhat degenerate, and its arrangement was irregular. The connective tissue was also increased in amount, while the muscle cells were scanty and atrophied. The presence of a hypertrophied right heart showed that the pulmonary tension must have been high, and the possibility of the media having given way from the undue strain must be admitted.

Calcification of the middle coat, too, suggests a similar inference, the adventitia and intima in such cases being sometimes but little abnormal.

Although it is not difficult to demonstrate the various ways in which atheroma may be produced, it is not easy to define its actual causes, considering its frequency in persons over middle age, and its special sites of election in the arterial tree.

The frequency with which atheroma occurs makes it

evident that some of the possible causes of focal lesions, which I have mentioned, have but little to do with its origin. Tuberculosis and syphilis, for example, must at once be ruled out of court, for these diseases, though prevalent enough, are by no means universal. The idea of atheroma as a local form of arterio-sclerosis must also be discarded, for arterio-sclerosis is always associated with increased arterial tension and considerable cardiac hypertrophy, while it is notorious that atheroma is common quite apart from these conditions. I believe, however, that the special frequency of atheroma in cases of arterio-sclerosis, is due, to some extent at least, to such a connection.

The infections, as a whole, can only be responsible for a small number of cases. It is true that acute arterial lesions of various kinds are not infrequently met with in these diseases, but post-mortem records show that gross changes are, at any rate, not specially common, and that, when present, they are rarely extensive. The frequency, however, with which infections occur during life, the exanthemata in childhood, and influenza, pneumonia, enteric fever, &c., in later years, make it possible that their influence is greater than has been hitherto supposed. And the little lesions, then initiated, may perhaps, as places of lessened resistance, allow other causes to produce a greater result than would otherwise be possible. The explanation is thus so far insufficient, and other causes must come into action.

The special distribution of atheromatous lesions has long been held to indicate that mechanical irritation plays an important part in the etiology of the disease. The buttressing of particular parts of the arterial system proves that special stress must obtain at these special points, even in normal circumstances; and certain vessels, such as the coronary arteries of the heart, and the intestinal and peripheral arteries, must be exposed to the possibility of injury to a much greater extent than those contained within organs which move but little, or are deeply situated. It is true that provision seems to have been made for such varying needs, but, nevertheless, the continued, though slight, trauma of the systolic waves must exert an influence, which in time may produce damage, and this result is more likely to be produced in cases where

physical labour is the chief occupation of the individual. Arterial tension is liable to many alterations from physiological influences, and these are almost always in the direction of hypertension. Exercise, the ingestion of food, cerebral excitement, for example, all produce an increase, and this may be considerable, if the stimulus is great, or frequently repeated, and the probability of mechanical irritation will, in consequence, be greater than in normal circumstances.

The form and site of the initial lesion may depend on several factors. In some instances, over-use of limbs may lead to their special involvement; in other cases, the aortic strain may be greatest; in others, again, a previous lesion may point a special site.

Sometimes the intima may be damaged, and the reparative new formation produces a pressure atrophy of the media. Sometimes the media may give way, and the interference with the vascular arrangements, which the scar produces, originates intimal irritation and hyperplasia. Sometimes the adventitia with its nutrient vessels may suffer first. But in every case, wherever the initial lesion is, if it is great, all the coats suffer; and, in some instances, all are affected at a very early period. The special liability of the cerebral vessels to syphilitic lesions is somewhat difficult to explain. Arterial disease in the brain is, however, so adverse to its proper working, and so often to life itself, that it has probably attracted more than its fair share of attention, while the special relationship of the lymphatics to the cerebral arteries, and the little support which the surrounding structures lend them, may make them especially liable to damage.

Atheroma, then, is not a special pathological entity, but the result of many different causes, several of which may be active in the same individual. Tuberculosis, syphilis, intoxications, infections, arterio-sclerosis, may all produce local lesions and mechanical irritation or strain, frequently repeated, and acting on a point of lessened resistance, may probably even initiate damage, and may certainly intensify any that is already present.

II.—ARTERIO-SCLEROSIS. ARTERIO-CAPILLARY FIBROSIS.

Arterio-sclerosis is a diffuse affection and all the arteries and capillaries, and, according to some authors, the veins as

well, are abnormal (Fig. 6). The lesions are, perhaps, best marked in the smaller vessels, although they are also present in the larger trunks. Diffuse sclerotic changes are frequently found in the viscera, and, in the centre of the fibrous masses, the vessels can be seen standing out, their lumen patent, and their walls distinctly and uniformly thickened. The larger vessels (*e.g.*, renal) are sometimes whitish and rather translucent, and their consistence is firmer than normal. The aorta is thickened, and, in old-standing cases, shows many atheromatous patches. In the early stages the resilience of the vessels may be good, but in advanced cases it is distinctly impaired.

Microscopic examination shows alterations in all the different layers of the vessel wall. The *intima* is usually more or less thickened. There is always great hypertrophy of the elastic fibrils, and two or more continuous laminæ, sometimes of considerable thickness, may be evident. In other cases of older date, degenerative changes have occurred, the elastic tissue being granular, and the connective tissue hyaline and sparsely nucleated, but the gross fatty and calcareous deposits, which are met with in the patchy forms, are rarely, if ever, seen. The *media* is always abnormal. In some instances it is thicker than usual, and the relative proportions of muscle, elastic and connective tissue are preserved, the only alteration being the hypertrophy. In other cases, it is thinner than normal, the muscle cells being atrophied and perhaps fatty; while, in a third group, the connective and elastic elements are in excess, and the muscle cells are degenerate and few in number (Fig. 7). In advanced examples of the last group, the muscle cells generally persist in greatest number along the edges of the coat. They are most numerous and least altered along the outer margin, and are sometimes present along the inner edge, while those in the centre of the layer have disappeared. The connective tissue is usually hyaline or granular, and sparsely nucleated, and the elastic tissue, though excessive in amount, is degenerate and granular. The *adventitial* changes are less variable. The outer coat is almost invariably thickened: in the early stages it is thickly nucleated, but in old-standing cases it is, as a rule, hyaline and sparsely nucleated. The elastic tissue here, as elsewhere, is always excessive.

The adventitial thickening is the only constant change in these cases. If the media is thickened or fibroid, the intima may be but little abnormal, but if the former is atrophied, the latter is generally hypertrophied. Dr. Russell states that the changes in the intra-renal vessels seem to tend to intimal thickening, while the medial thickening is well marked in the extra-renal vessels, but this may be due to the renal lesion being of older date.

There has been considerable discussion in the past with regard to the histological details of the arterial lesion ; but it is now generally agreed that medial hypertrophy is an early and essential phase, that it occurs throughout the whole arterial system, and that fibroid changes supervene both here and in the adventitia at a very early period.

The capillary vessels are also, as a rule, abnormal. A healthy capillary, cut in section, is apt to escape observation, the wall being a mere hair line ; but in the cases, which we are considering, a double contour is usually visible, the wall being several times its usual thickness ; the lumen, too, seems somewhat narrowed. Somewhat similar appearances may be seen in the capillaries of granulation tissue, and in cases where chronic congestion has obtained for some time.

Arterio-sclerosis is very frequently associated with chronic renal disease, especially the granular variety, but it may occur without any renal lesion at all, or associated with one which is evidently secondary to itself (arterio-sclerotic kidney). The one common feature of all these cases is the presence of continued high arterial tension, which is now accepted as its immediate cause.

Hypertrophy of the media, and probably of the adventitia as well, ensues as the natural sequel of the increased work which the vessels are called upon to perform. The defective nutrition, however, which the toxæmia entails, leads in time to the atrophy of the "noble" tissue, and the hypertrophy of the less highly specialised connective tissue, according to the usual rules. Thoma considers that the intimal hyperplasia is due to dilatation of the vessel and consequent slowing of the blood stream. I have already considered his theories elsewhere. A much more probable reason is the continued irritation of the intima by the abnormal substances in the blood stream.

The origin of the hypertension has been ascribed, in the renal cases, to inadequacy of the renal excretion, and, in the idiopathic cases, to "repletion," or to intoxications of various kinds, in particular those due to gastro-intestinal disturbances. Such theories will not, however, account for Dr. Thayer's records of hypertension following enteric fever, which seem to demand a special explanation.

Collections of mononuclear cells are not infrequently found to be present, in cases of infective disease, around the minute arterioles of the viscera. Some of the cells are evidently lymphocytes, others are probably of fixed tissue origin, and the cells of the parenchyma in their vicinity may or may not be degenerate or necrotic. In extreme cases the connective tissue may be proliferating. These lesions, which have been found in many of the organs (liver, spleen, kidneys, heart), are, of course, microscopic in size, and probably often of only temporary duration, but their intensity, in some cases, and their ubiquity, in most, quite apart from any special visceral determination, suggest that their collective results may be greater than has been hitherto supposed. The interference with the outer tunic of the arteries, which their presence entails, may quite well initiate changes, which ultimately tend to raise the peripheral resistance, and so to heighten the arterial pressure.

The common association of focal and diffuse lesions is not difficult to understand. Atheromatous patches are, in many instances, the results of local vasal sclerosis. And arteries continually exposed to extra strain and to a chronic intoxication must be far more liable to suffer locally from causes which might produce little effect on normal vessels; and it must not be forgotten that high tension is generally due to hygienic or dietetic misbehaviour.

Arterio-sclerosis is a diffuse lesion, and affects the whole vascular system. Its essential cause is increase of the arterial tension. This may be due to renal disease, or result, without renal flaw, from chronic intoxications of various kinds. Facts are still wanting to prove a causal relationship between it and the infections, but all the available evidence tends to show that the connection may be intimate.

It is important to recognise fully the effects which the infections may produce in the vascular system. I have already referred to the intimal thickenings which may occur in such cases, to the changes met with in the vasa vasorum, and to the periarterial foci in the viscera. Two more conditions yet remain.

Dr. Klein, many years ago, described local hyaline masses which he had found in the subendothelial tissue of the renal and splenic capillaries and arterioles, in cases of scarlatina, and similar lesions of widespread distribution have since been found in cases of small-pox and enteric fever.[1]

The elastic tissue of the larger vessels, at any rate, is almost invariably found to be altered after acute disease. Normally, in the aorta, the fibrils are of varying size, some larger and some smaller, but a definite parallel arrangement is always visible, and their outline is more or less wavy, and everywhere distinct and sharp. In the cases which we are considering all these details are lost. The clear, crisp outline is blurred, the fibrils do not stain so deeply or so uniformly as usual, and the parallel arrangement is indistinct (Fig. 8). I have found this condition in cases of pneumonia, phthisis, and acute peritonitis, and Wiesel has recorded its constant occurrence in enteric fever.

[1] *Cf.* Cowan, "The Heart in Acute Disease," *Jour. Path. and Bact.*, 1903, Vol. IX., p. 87.

UNSUSPECTED TUBERCULOUS PERITONITIS.

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THERE is no circumstance in which the surgeon has more ample scope for the exercise of his powers of differential diagnosis than in dealing with one of the acute affections of the abdomen, to which he is so frequently summoned with a view to deciding upon the necessity of immediate operation. Unfortunately, especially in the earlier stages, the symptoms resulting from the most different conditions are so similar, that the difficulty of diagnosis is great, and often insuperable. Thus, the operation undertaken in such cases is often in the first instance performed as an exploratory measure, and serves to confirm or overthrow a diagnosis, which must have hitherto been regarded only as provisional. The comparative safety of such a valuable means of diagnosis must not encourage the surgeon to take unfair advantage of it, for it is his duty to leave no stone unturned in his endeavour to unravel the mystery of the case, in order that as little as possible may be left to be discovered during the performance of the operation. It is alike to the advantage of the patient and the credit of the surgeon that the exploration of the case should be as complete as possible before the operation is commenced.

The acute abdominal affections, which demand surgical interference as an emergency operation, may be grouped into two categories. The first group includes those cases, in which the acute abdominal attack is essentially primary and immediate, as, for instance, acute internal strangulation of the intestine, and many cases of acute appendicitis. In the other group are included those cases in which the acute abdominal crisis occurs as a complication or exacerbation of some more chronic affection, as, for instance, the rupture of a chronic gastric ulcer, or the sudden supervention of symptoms of acute intestinal obstruction in a case of gradually increasing stricture of the bowel. Errors of diagnosis frequently result

from the difficulty in distinguishing between these two groups of cases. Thus, for example, a carcinomatous stricture of the large intestine may run an insidious course, almost unattended with symptoms, until, with little warning, the case suddenly assumes a very grave aspect, as the result of the supervention of symptoms of acute intestinal obstruction, or the occurrence of acute septic peritonitis following the rupture of the ulcerated bowel above the stricture.

In such cases the physical examination of the patient may altogether fail to reveal the important fact that the acute symptoms are the result of a sudden complication, occurring in the course of a chronic disease, and the only hope of arriving at a correct diagnosis lies in combining an accurate physical examination with a detailed investigation of the antecedent history.

It is in this particular connection that tuberculous peritonitis is a fertile source of error in abdominal diagnosis. There is no affection of the abdomen which may pursue a more latent course, and, without any clear warning, occasion a severe abdominal crisis. The true cause of the latter may remain latent, unsuspected, until an exploratory operation has been undertaken.

The great practical interest of tuberculous peritonitis, when regarded from this standpoint, is due, not merely to the sudden incidence of acute symptoms, but also to the remarkable resemblance which these acute symptoms may bear to other more ordinary acute abdominal affections.

In dealing with cases of acute abdominal emergency, it is useful to recognise certain types to one or another of which most cases can, more or less definitely, be referred. The first type includes those numerous cases, in which the evidence points, more or less clearly, to the occurrence of a sudden and severe peritoneal infection, such as is seen in its most pronounced form in the rupture of one of the hollow viscera. The evidences, afforded by abdominal examination and the intensity of the collapse which suddenly supervenes, usually serve to distinguish these cases of acute peritonitis, to which, however, the symptoms of intra-peritoneal hæmorrhage may often be very similar.

The second type is illustrated by most forms of acute

intestinal obstruction. In the majority of such cases, the examination of the abdomen gives chiefly negative results : there is no marked distension ; the ordinary signs of peritonitis, at least in the early stages, are absent ; and the peristaltic movements of the intestine are not visible. The most prominent symptom is the early and repeated vomiting.

The third type includes those cases in which symptoms of acute obstruction more or less suddenly supervene upon a train of more chronic symptoms, indicative of a slowly increasing obstruction, as, for instance, in the sudden blocking of a carcinomatous stricture of the large intestine. In this type of case, the striking feature, revealed by abdominal examination, is a considerable degree of distension, which can often readily be distinguished from the distension due to peritonitis by the presence of visible peristaltic movement in the coils of dilated and hypertrophied intestine. The onset of vomiting only after the distension of the abdomen has reached a marked degree, and usually after the obstruction of the bowels is of considerable duration, is often a characteristic feature of cases of this nature.

The methodical investigation of an acute abdominal case may advantageously be carried out by attempting in the first instance to assign the case to one or another of the above-mentioned types, and to endeavour to answer the following questions :—Is the patient suffering from an acute peritoneal infection (or possibly hæmorrhage) ? Do the symptoms point to the presence of some form of acute intestinal obstruction ? Does the evidence suggest that the symptoms of acute obstruction have supervened upon some more chronic condition ?

By approaching the subject in this way, the surgeon is more likely to be led up gradually to a correct diagnosis than if he endeavours to decide at one step upon the exact nature of the case.

These remarks have been made with the object of showing that tuberculous peritonitis is, from the clinical point of view, a peculiarly imitative disease, and that there is hardly any acute abdominal affection which it may not, in one of its unsuspected forms, simulate. In this connection. it is interesting to remember that some of the earliest cases of tuberculous peritonitis, submitted to operation, were so treated, not

intentionally, but as the result of the disease having been mistaken for cystic disease of the ovary.

The practical position is this :—Tuberculous peritonitis, pursuing an altogether latent and, therefore, unsuspected course, may suddenly manifest itself by the development of certain acute abdominal symptoms, which are liable to be altogether wrongly interpreted until an operation is performed; and further, that these acute symptoms may vary within wide limits, and may imitate almost any recognised type of acute abdominal disease.

Occasionally, the disease presents itself with sudden manifestations, resembling those of an intense general peritonitis, and thus it may readily be mistaken for acute appendicitis, which is the only common cause of acute peritonitis at the age at which the mistake is most likely to be made. It need hardly be observed that, in some of the less acute forms of appendicitis, the difficulty in diagnosis may be extreme. A girl, aged 11 years, was seen at the Victoria Hospital for Children with Dr. W. J. Fenton. For three weeks she had complained of abdominal pain, but had continued to attend school. On admission the temperature was 101°; the child did not look seriously ill; the lower part of the abdomen was slightly full, and there was tenderness, which was much more marked in the right iliac region than elsewhere; in the same region there was dulness, and muscular rigidity prevented deep palpation. In spite of the presence of slightly suspicious signs of consolidation at the apex of the left lung, the diagnosis of subacute appendicitis was made with considerable confidence, and it was fully expected that, when the abdominal muscles were relaxed by the administration of an anæsthetic, a definite lump would be felt in the region of the cæcum, and that operation would reveal the presence of an abscess. Such, however, was not the case, and no resistance or tumour could be felt. The abdomen was opened in the right iliac region, and the true nature of the case was at once revealed—a large quantity of clear serous fluid escaped, and all those parts of the surface of the peritoneum, which could be explored, were thickly covered with small tuberculous nodules. After evacuating the fluid as freely as possible, the abdomen was closed. The case is too recent

to allow the result to be recorded, beyond observing that the abdominal pain was relieved, and that the temperature remained normal.

Again, tuberculous peritonitis may unexpectedly be discovered in a case diagnosed as acute intestinal obstruction. And here it is necessary to observe that two separate conditions must clearly be distinguished. In one case an actual cause of obstruction, such as a peritoneal band or adhesion, is discovered, and the only unexpected element in the case is the presence of active, and often extensive, tuberculous peritonitis. In another case, however, the most careful investigation fails to detect any cause of actual obstruction, and it can only be concluded that the constipation of tuberculous peritonitis, with vomiting, may closely simulate the symptoms of an actual mechanical obstruction. In both cases, the result of operation may prove most satisfactory, not only in relieving any obstruction which may be present, but also in exerting a most favourable influence upon the course of the disease.

The following case is recorded with the kind permission of Mr. A. E. Barker. A young woman, 23 years of age, was admitted into University College Hospital with symptoms of acute intestinal obstruction. Three months before admission she had an attack of abdominal pain, lasting a week, and for some weeks before admission had had occasional slight attacks of diarrhœa. Four days before admission, whilst in a train, she was seized with severe pain across the lower part of the abdomen, and four hours later vomited. From this time there was complete obstruction of the bowels, and the vomiting persisted. The patient, when brought to the hospital, presented the characteristic abdominal aspect; there was uniform distension with slight tenderness of the abdomen, which was resonant, except in the flanks; pelvic examination revealed nothing abnormal. On opening the abdomen, considerable quantities of clear fluid escaped, and the peritoneum of the intestines, mesentery, and omentum was found to be thickly covered with tuberculous granulations. On passing a finger downwards, a coil of small intestine was found to be adherent to the brim of the pelvis posteriorly by a stout band, beneath which another coil was strangulated. The obstruction was relieved by dividing the band. The peritoneal cavity having

been flushed with boiled water, some iodoform emulsion was introduced, and the abdomen closed. The patient made an uninterrupted recovery, and left the hospital on the thirty-eighth day. In this case, the presence of tuberculous peritonitis was entirely unsuspected, for the only previous symptoms which could be referred to the disease, until the onset of the acute symptoms of obstruction, were the single attack of abdominal pain, and several slight attacks of diarrhœa. The favourable effect of the operation was seen, not merely in the relief of the obstruction, but almost certainly in checking the course of the disease, for several years later the patient presented all the appearances of perfect health.

The following two cases illustrate the sudden supervention of acute symptoms in the course of tuberculous peritonitis, simulating those of intestinal obstruction, but in which no cause of actual mechanical obstruction was discovered during operation.

A previously healthy boy, ten years of age, was brought home to London from the seaside on August 1, 1905, on account of whooping cough. He developed broncho-pneumonia, and for a few days was seriously ill. His condition then improved until August 11, when he vomited repeatedly. On the following day the boy seemed better, and the sickness ceased, but the temperature was 101°. On August 13 there was severe abdominal pain, chiefly in the umbilical region, and the abdomen was swollen. On August 14 urgent vomiting again set in, and the bowels, which had been moved slightly by an enema on August 12, had not acted since. When seen with Dr. W. Murray, of Hornsey, on the fourth day of the acute abdominal attack, the boy was evidently desperately ill; the temperature was 99, the pulse 140, and the tongue dry. The abdomen was moderately distended, but no localised swelling could be felt by abdominal or rectal examination. At frequent intervals the child screamed out with abdominal pain, and with each attack the peristaltic movement of the intestines could be seen very clearly. The vomit was bilious. The diagnosis of acute intestinal obstruction, probably by some form of internal strangulation, was made, and immediate operation was advised, although, on account of the child's very serious condition, the chance of a successful result seemed very

remote. On opening the abdomen some clear fluid escaped, and the coils of small intestine, which presented in the wound, were greatly distended and deeply congested. In order to permit a more satisfactory exploration, a coil of the distended gut was incised, and a large quantity of gas and fluid fæcal matter evacuated. It was now found that there were large masses of hard glands in the mesentery, many of which were evidently calcareous, and also scattered tuberculous deposits on the surface of the mesentery and intestines. No kind of obstruction of the intestine was found, and the abdomen was closed. The child sank gradually and died on the following morning.

On looking back at this case, it may perhaps be felt that the possibility of tuberculous peritonitis ought to have been more seriously entertained in view of the recent chest complications, which had occurred in the course of the whooping cough. In the first instance, some doubt was felt as to whether the case was one of acute peritonitis, probably due to appendicitis, but this diagnosis was abandoned in favour of acute obstruction, largely on account of the very exaggerated visible peristalsis, which, although not common in cases of simple acute obstruction, can hardly be present in association with an acute general peritonitis.

Reference may also be made to a case of tuberculous peritonitis recorded elsewhere by the writer (*Clinical Society's Transactions*, Vol. XXXI., 1898, p. 212), in which attention was drawn to a condition, which may possibly serve as one explanation of the sudden development of acute symptoms in the course of a latent tuberculous peritonitis. The case was that of a woman who, after ailing for a month, was suddenly attacked with severe abdominal pain and vomiting, with almost complete obstruction of the bowels. No diagnosis more definite than "acute intestinal obstruction" could be made, although it was expected that the small intestine was involved, and that the obstruction was caused by a band, or adhesion. Operation was performed on the fourth day. On opening the abdomen, a quantity of clear, slightly blood-stained fluid escaped, and scattered tuberculous granulations were seen on the surface of the intestines. One coil of the atter was strikingly distinguished by its more swollen and

congested appearance, and the corresponding part of the mesentery formed a solid thick deeply congested mass. In this part of the intestine and mesentery, the tuberculous deposits were much more numerous than elsewhere. After evacuating the fluid effusion as completely as possible, the abdomen was closed. The acute symptoms quickly subsided after the operation, and the patient left the hospital in three weeks. The swollen and congested condition of the bowel and mesentery in the part, where the tuberculous deposits were most abundant, can best be explained as the result of thrombosis in the tributaries of the superior mesenteric vein, and, in recording the case, the view was put forward that the temporary paralysis of the bowel resulting therefrom was the cause of the acute symptoms suggestive of intestinal obstruction. With the gradual restoration of the circulation by collateral channels, the paralysed segment of bowel recovered its power of peristaltic movement, and the symptoms were relieved. Such a paralysis is known to be a sufficient cause of obstruction of the intestine, as is seen occasionally after the reduction of a strangulated hernia, and the gross appearances of the bowel in such cases, and in that above recorded, are very similar.

It is, therefore, suggested that the onset of acute symptoms, in the course of tuberculous peritonitis, may, in some cases at least, be due to a secondary thrombosis in some part of the distribution of the mesenteric vessels.

In yet another of its unusual clinical forms, tuberculous peritonitis produces symptoms of a less acute character than those above described, and the disease may readily be mistaken for the more chronic forms of intestinal obstruction, such as is most commonly associated with a gradually increasing narrowing of the large intestine.

A man, 31 years of age, was admitted into the University College Hospital on August 24, 1905, as a case of intestinal obstruction requiring immediate operation. He gave the following history:—Although never robust, he had enjoyed good general health. Since Christmas, 1904, however, he had suffered from indigestion, with pain after food, but no vomiting. He did not lose flesh. On July 29, he started for a holiday on a coasting steamer, and a few days later was attacked with "a cramping pain across the loins and stomach."

The pain continued and there was very troublesome constipation. On August 14, he returned home, and two days later took to his bed; abdominal pain continued and only very unsatisfactory actions of the bowels were obtained by the use of aperients. On August 23, the abdominal pain became more severe, and enemata failed to relieve the constipation. On the following day, the pain was still worse, and the abdomen was becoming gradually more distended; vomiting occurred for the first time. There was no history of the passage of blood from the bowel.

Examination of the patient, after his admission into the hospital, showed a considerable degree of general abdominal distension, with visible peristaltic movements in the intestines. There was slight shifting dulness in the flanks, but all other parts of the abdomen were tympanitic; and no tumour could be felt by abdominal or rectal examination. The patient's general condition was fairly good; he was thin, but not emaciated; the temperature was normal. Little doubt was felt that the patient was suffering from intestinal obstruction, and, taking into account the subacute course of the symptoms, the considerable abdominal distension, the well-marked visible peristalsis, and the late onset of the vomiting, it was thought most probable that the obstruction was situated in the large intestine. On opening the abdomen, a large quantity—certainly many pints—of clear fluid escaped, and the presence of tuberculous peritonitis was at once established. The tuberculous deposit was most abundant in the mesentery, which was greatly thickened, but small tubercles were scattered pretty freely over the surface of the small intestine. No cause of mechanical obstruction was found, and after evacuating the fluid the abdomen was closed. The abdominal pain was relieved by the operation, and at first there was no return of the vomiting. The bowels were opened by an enema on the second day, and acted spontaneously on the third. From this date the patient rapidly became extremely weak, and uncontrollable vomiting set in. The temperature became subnormal, and the pulse rate rose to 130. Death occurred on the tenth day after the operation, and during the two preceding days the patient was restless and at times delirious, and the vomit contained arterial blood.

The post-mortem examination revealed early tuberculous meningitis. There was the scar of a healed ulcer in the stomach, and the mucous membrane was deeply congested. The tuberculous peritonitis was general, and in places the coils of intestine were adherent by layers of recent lymph around encysted collections of fluid.

On looking back upon this case, in the light of the correct diagnosis, it is difficult to see upon what basis a suspicion of the presence of tuberculous peritonitis could have been founded before the abdomen was opened. It was confidently expected that some definite cause of chronic obstruction, probably a growth in the bowel, would be found, and that the treatment for the immediate relief of the symptoms would consist either in establishing an intestinal anastomosis, or in performing colotomy.

At the risk of repetition, reference may again be made to the visible peristalsis, which was so marked a feature in two of the above cases. Apart from the fact that in neither case was any obstruction discovered, the presence of this symptom is of interest as showing that, whereas peristalsis is undoubtedly arrested by the ordinary forms of acute peritonitis, in the very different condition present in tuberculous peritonitis the same effect is not produced. Not being paralysed, the intestines may, indeed, be called upon to perform unusually vigorous peristaltic movements in response to the obstacle caused by the accumulation of large quantities of fluid around them, the thickening of the mesentery, and often the presence of scattered adhesions between the intestinal coils.

Although not strictly included within the title of this communication, reference may shortly be made to two cases affording another striking example of the close similarity which may exist between the symptoms of abdominal tuberculosis and those of other affections of the abdominal viscera. The two cases occurred in children, and in each, although the symptoms were not quite characteristic, the diagnosis of acute intussusception was made; operation was performed, and the symptoms were found to be the result of tuberculous disease of the mesenteric glands.

A boy, aged three years and a half, was admitted into the Victoria Hospital for Children in March, 1904. For about a

week he had complained of abdominal pain, and for four days before admission there was repeated vomiting with complete intestinal obstruction. On admission the child was profoundly ill, restless, with sunken eyes, a dry, coated tongue, and pulse rate 140. The abdomen was not distended, and no tumour could be felt on abdominal, or rectal, examination. There was no history of the discharge of blood, or mucus, from the bowel. Under chloroform, a tumour could be distinctly felt below the left costal margin, and was thought to be an intussusception. On opening the abdomen, the tumour proved to be the largest of a considerable number of tuberculous glands in the mesentery. The cause of the obstruction was at once obvious, for, in the position of the largest gland, a firm adhesion was dragging on the gut, which, above the obstruction, was dilated, and below it, empty and contracted. By the division of the band, the obstruction was easily relieved. No attempt was made to deal with the diseased glands on account of the child's serious condition, and it is, indeed, doubtful if anything in this direction could have been done. The child made a rapid recovery, and left the hospital on the thirtieth day.

The other case is recorded, with the permission of Mr. Godlee, under whose care it occurred in University College Hospital. As in the other case, the patient was a young child, and the diagnosis of acute intussusception was founded upon the presence of the symptoms of acute intestinal obstruction, associated with the detection of a tumour situated below the right costal margin, and having the characters of that formed by an intussusception. The tumour proved to be a large caseous gland, which had caused strangulation of a coil of small intestine, by pushing it forward beneath a fibrous band. The latter was divided, and the caseous gland thoroughly scraped. In this case also the result was most satisfactory.

The symptoms of acute intussusception in young children are so characteristic that mistakes in diagnosis are probably less common than in almost any other acute abdominal affection. It is very rare that any one of the four symptoms—pain, vomiting, discharge of blood and mucus, and the presence of an abdominal tumour—is absent. It is interesting to note that, in the two cases recorded above, this rule did

not break down, for, although the clinical resemblance to acute intussusception was very close, one of the four cardinal symptoms—blood-stained discharge from the rectum—was wanting.

The diagnosis of acute abdominal affections is particularly dependent upon a general consideration of all aspects of the case, for, in most instances, no pathognomonic symptom is present. The possibilities have to be weighed carefully one against another, and in this way alone can the probability be reached.

This short communication will have served its purpose, if it succeeds in reminding the surgeon, who finds himself face to face with an obscure abdominal case, to ask himself the question—May this possibly be a case of tuberculous peritonitis?

VALVULAR DISEASE OF THE HEART.

III.—AORTIC REGURGITATION.

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AORTIC regurgitation exists whenever, during diastole, the valves permit reflux into the left ventricle of part of the blood in the aorta. Such a condition may be brought about either by disease of the valves or by defect without disease; in this latter case, the valves are ineffectual to close a gaping aortic orifice. It is maintained on the highest authority that this condition of dilated aortic orifice, with healthy but ineffectual valves, may be the sole defect; but I have never seen it apart from atheromatous dilatation of the aorta, and, bearing in mind the normal rigidity of the aortic ring, it is hard to appreciate the possibility of such a condition apart from profound structural change in the immediate vicinity of the valves. Such a condition of simple stretching of the orifice, if it occurs, would presumably be found along with dilatation of the ventricular wall, such as results from degenerative disease of the myocardium, or with simple dilatation of the aorta, apart from atheroma, such as might result from the pressure of tumours, or the like.

Structural disease of the aortic valves may be developmental, or brought about by localised inflammation or injury, or a mere local evidence of a generalised sclerosis of the whole arterial tree, so that we recognise a *cardiac* type, and an *arterial* or *atheromatous* type, according as the origin of the disease has lain in the heart itself, or in the aorta and arteries. Thus, the types of valvular disease at the aortic and mitral orifices are the same; but, whereas inflammatory lesions predominate at the mitral, degenerative sclerotic lesions predominate at the aortic orifice, which has to bear the greater strain.

Aortic regurgitation alone is a comparatively rare lesion. In the large majority of cases it is combined with aortic obstruction as well: the rigid valves affording an actual barrier even in the

presence of dilatation of the orifice. In 200 cases of aortic valvular disease, the clinical evidence of associated aortic obstruction was found in no less than 164. Of the remaining 36 cases, 28 showed concomitant affection of the mitral valve. The pure lesion is commoner in the cardiac than in the arterial type, but when endocarditis attacks the aortic valve, it nearly always affects the mitral valve as well. Mitral stenosis is a not infrequent association, and in late stages the relative mitral insufficiency induced by dilatation of the left ventricle. Consecutive incompetence of a healthy mitral valve is much less frequent than is generally supposed, for the persistent strain has commonly caused some hardening of the mitral valve, and, moreover, a healthy mitral valve possesses a considerable reserve of expansibility.

The essential difference in the causation, morbid anatomy, and, to some extent, in the clinical evidences of the cardiac and arterial types, makes it well nigh impossible to present a single picture of aortic regurgitation. In attempting to do so, one is hampered at every step by points of contrast. The *cardiac* type is much most frequent in the young adult, and is occasionally met with even in children. The very large majority of cases are referable to acute rheumatism, but it may follow any acute infection. Even when due to endocarditis, the lesion is far more common in men than in women, and it is difficult to see what other factor than strain can explain the special susceptibility of the male sex. Under this type we must include also, because of their clinical characters, cases due to rupture of a valve, whether from sudden strain or from a blow, also those rare cases in which the valves are fenestrated from atrophic change, and cases of congenital malformation.

In the *arterial* type, we have to deal with a chronic degenerative disease of the general arterial system extending ultimately to the aortic valves. Very exceptionally the atheroma is limited to the root of the aorta, and little or none is found in the peripheral arteries: probably such a condition is of syphilitic origin. Unlike the cardiac type, it is a disease of late middle age, or of old age, and is much more frequent in men than in women, as one would expect from the fact that the familiar causes of endarteritis particularly befall the male sex. Yet the strain that helps to produce atheroma is, by no

means, only muscular overstrain. It embraces likewise the high vascular tension, to which the indolent and overfed are even more prone than those who live laborious days. The arterial form is also not infrequently linked to locomotor ataxy, both bring parasyphilitic lesions.

The appearance of the local lesions differs considerably, not only in the different types of aortic regurgitation, but also in different cases and different stages of the same type. In a cardiac case of recent origin, vegetations are found varying in size from small beads to large fungating masses. In later stages, these vegetations are represented by firm nodules, blended with more or less atheroma. At first the valves are but slightly thickened and deformed, but later become rigid, crumpled, and indurated with atheromatous, or calcified plaques. They may be welded together, or may even be adherent to the aortic wall. All three valves usually show similar changes, but now and again one or more may be found wholly or partially exempt. Such changes will almost necessarily produce narrowing of the orifice as well as incompetence of the valves. If the endocarditis is malignant, there may be actual loss of substance from ulceration, and this, in turn, may lead to aneurysmal bulging, or perforation of a valve. The initial lesions are usually adjacent and limited to the free border of the valves on the ventricular surface. Should these parts escape, there may be considerable disease of the rest of the valve, and yet no insufficiency, for these are the points of contact in closure. In a case of endocarditic origin, the changes may be confined to the valves, but, in cases of long standing, atheromatous changes in some degree are usually found in the aorta, and even in the arteries, as a result of the undue strain to which they are subjected. In the aorta, in the absence of extensive atheroma, the wall is often flabby, inelastic, and pouched; this is due to the rapid fluctuation of pressure between systole and diastole. In systole, the aorta is stretched beyond its full normal capacity, while, in diastole, there is not blood enough for it to grip.

Cases of ruptured aortic valve must be assigned to the cardiac group, on account of the character of the clinical manifestations. Rupture most often occurs in a posterior cusp; the rent may be a mere marginal slit, or it may extend

to the whole depth of the valve. A ruptured valve is nearly always found to be diseased as well; such condition being the predisposing cause and not the consequence of rupture.

Fenestration of the valve requires brief mention in this connection. It is an atrophic process that, by means of thinning out of the tissue of the valve, leads to the production of linear apertures. As an actual cause of aortic regurgitation, the condition is almost negligible, for the reason that the apertures are apt to be adjacent to the free border, so as to be occluded by contact with the other cusps in closure: if more remote, they will, at most, allow only a low degree of regurgitation.

Congenital aortic regurgitation is very rare; arrest of development of one or more valves, fusion and sclerosis have all been recorded.

The morbid lesions of the *arterial type* may be readily distinguished, in most instances, from those of the cardiac type, though it must be allowed that cardiac cases of long standing approximate more and more nearly, in their morbid anatomy, to the arterial type. There is almost invariably some degree of sclerosis of the peripheral arteries, leading up to the extensive atheromatous changes characteristically found in the aorta. The changes are most extensive, and most advanced in the ascending portion of the aorta. The vessel is thickened, and presents on its inner surface yellowish grey atheromatous plaques, which are indurated and often calcareous, and not infrequently ulcerated. The disease may affect the whole surface of the ascending aorta, which is dilated either in the whole or in part of its circumference, so as to present, in extreme cases, a considerable pouch just above the valves, amounting to a true aneurysm. The dilatation is, in the first instance, due to loss of elasticity of the aortic wall, but the process is carried further by the constant overstrain of the large and powerful left ventricle that ensues on incompetence of the aortic valves. The aorta is elongated as well, so that its arch rises notably higher than normal, and at the same time leads to a downward and outward displacement of the heart. The atheromatous change commonly involves the mouths of the coronary arteries without much

affection of their trunks. The aortic valves are rigid and calcareous, and their edges blunted. Unlike the cardiac type, the disease is apt to affect first and most the attachment of the valve, leaving its free border, at this stage, relatively sound.

Apart from the aorta and the valves, the changes in the heart itself, in the two types of aortic regurgitation, follow the same general lines, the differences being rather of degree than of kind. Pericarditis is common in the cardiac type, though much less so than in mitral disease; adherent pericardium, and indeed pericarditis, except as a terminal consequence of associated interstitial nephritis, are rare in the arterial form. It has been contended that, in some cases, the endocarditis is consequent on the pericarditis by spread to the valves; but it is much more probable that each may be attributed to a common cause. The first effect in the heart is dilatation of the left ventricle brought about by the increased strain of the aortic circulation, and by the need of accommodating a double supply of blood, and subsequently hypertrophy due to the increased work in voiding it. If the heart is cut across, the bulging of the septum into the right ventricle seems at times to almost obliterate its cavity, and this may, perhaps, partly explain the occasional occurrence of right-sided back pressure, while the mitral valve is competent. The very large heart, cor bovinum, seen in some cases of aortic regurgitation, is more characteristic of the cardiac than of the arterial type, because its production is a matter of time, and this, in turn, depends on the maintenance of the coronary blood supply, which is less likely to be interfered with. Degenerative changes in the myocardium, either fibroid or fatty, are, for the same reason, more marked in the arterial type. So long as the left ventricle sustains the increased strain, the changes in the left auricle are of the slightest; but as soon as this ceases to be, the same sequence of dilatation and hypertrophy occurs as in the left ventricle, keeping the stress, for still a further period, off the pulmonary circulation. As soon as the power of the left heart begins to fail, and even while the mitral valve is still competent, progressive congestion and œdema of the lungs set in, as well as some degree of dilatation and hypertrophy of the right ventricle. After the mitral

valve has yielded, the consecutive lesions of mitral insufficiency put in an appearance on the right side of the heart, and in the various viscera and tissues.

In the *cardiac type* of aortic regurgitation, it is only in the case of rupture, or perforation of a valve, that the onset of symptoms is abrupt. The occurrence is usually marked by intense cardiac pain and paroxysmal dyspnœa ; sometimes with a state of syncope, which may last for hours. The symptoms at once attract attention to the heart, and examination discloses the cause. In some cases the heart yields so rapidly that the consequent dilatation may prove fatal before hypertrophy is possible, and death occurs in a few days, in spite of complete rest and recumbency. More often, however, the cardiac oppression gradually subsides, and, in the course of a month or so, circulatory equilibrium is restored to a degree that permits the patient to live and even to enjoy life, provided that he is shielded from all but the least possible physical exertion.

Onset in the wake of acute endocarditis is essentially insidious ; indeed, it is usually latent, until some disturbance of general health brings the patient for advice, and the cardiac lesion is found. The length of latency will, of course, depend on the good health and power of the patient to rest the heart, so that long latency is much more common in women than in men. There is no aortic facies to afford a clue, merely anæmic pallor. Paradoxically, too, the earliest symptoms are apt to be arterial, and not cardiac ; for the cases due to endocarditis arise at a period of life when the heart muscle and arterial walls are still young and healthy, so that full compensatory hypertrophy is possible, and cardiac symptoms only arise when the coronary circulation becomes ineffectual to supply the muscle with blood. For the same reason, pain is not a characteristic feature of the cardiac type in its early stages. If there are any symptoms in the heart, they are now no more than a slight sense of oppression or a little palpitation, readily relieved by rest. It is the rapid fluctuations of arterial pressure that are apt to induce the earliest symptoms. Such symptoms are naturally most in evidence in the cerebral circulation, and are chiefly felt on exertion, or on alteration of posture. Sudden attacks of giddiness or

faintness, dinning in the ears, transient disturbance of vision, and the like, are frequent.

Onset in the *arterial* form is, in the nature of things, slow and insidious. In the early stages, the symptoms are referable to the arterial disease and disordered arterial circulation, so that these differ according as the stress falls chiefly on brain, kidney, heart, or other organ: with involvement of the coronary arteries, cardiac disability, and cardiac pain dominate the picture. The aortic facies, the combined product of arterial anæmia and sclerosis of the arterioles, is common. Vertigo, headache, dinning in the ears, and obstinate insomnia are apt to be present. These symptoms are often accentuated by recumbency, so that night is turned into distressful day. Patients suffering in this way are often fractious, depressed, and irritable, and at times actually insane. Pulmonary disorders, such as cough and shortness of breath, are common. These are seldom a secondary consequence of the cardiac disease, but are due to an associated degenerative lesion producing emphysema and bronchitis. Severe crises of breathlessness are occasional, particularly when the aortic disease is associated with renal inadequacy: such are of mixed origin, cardiac and uræmic. Dyspeptic troubles are merely accidental, and far less frequent than in mitral disease. Pain is vastly more common in the arterial than in the cardiac type, and takes on distinctive characters. There may be a dull boring substernal ache, more constant than intense, but increased by exertion and more or less relieved by rest: such is the pain of aortitis. Or there may be simple cardiac pain, or typical angina, or any intermediate form.

Of 129 cases of aortic valvular disease, of which 101 were cases of double aortic disease, and 28 of pure regurgitation, 12 had true angina, and 45 some other form of cardiac pain. Angina was present in 1 only of the 28 cases of pure regurgitation, and in 11 of the 101 cases of double aortic disease, so that angina would seem to be much more common with the combined lesion than with simple regurgitation. The cases of aortic disease, complicated with mitral stenosis, were remarkably free from pain, while on the other hand, the presence of mitral insufficiency seemed to increase the tendency. The value of this evidence, however, is discounted by the difficulty

of deciding, in the presence of aortic regurgitation, whether the mitral obstruction is real or only apparent. At the same time it would be reasonable to suppose that, with the removal of one of the forces tending to unduly distend the left ventricle, pain should be less. On the other hand, the greater liability to pain, with added mitral insufficiency, merely expresses the fact that the mitral lesion, as a rule, appears in the later and more advanced stages of the aortic disease.

The physical signs of aortic regurgitation of *cardiac* type are as constant and definite as the symptoms are vague and variable. A casual glance may suffice to make a diagnosis from the visible and exaggerated pulsation of the carotid, facial, and temporal arteries; the same feature is never seen in mitral disease, for, except in aortic regurgitation, no matter how tumultuous the heart may be, the arteries are relatively calm. Capillary pulsation is generally readily demonstrable. It is essentially the product of wide dilatation and relative emptiness of the peripheral arterioles, a condition habitually present in the cardiac form. Some writers have attributed it to spasm of the small arterioles which are consequently unable to regulate the flow of the blood thrown into them, with the result that the current reflects the contractions of the heart. If this is so, capillary pulsation should be found in other conditions of peripheral vaso-constriction, which is not the case. On the other hand, it is not infrequently seen in other conditions of low arterial tension, more particularly in fever. Not much reliance can be placed on the time relation of the waxing and waning of the capillary flush to systole and diastole of the heart, on account of the extreme difficulty of determining it. It is not uncommon, in cases of marked capillary pulsation, to find, when examining the chest, a red ring whenever the stethoscope has been applied, and capillary pulsation may be seen at its margin. A moist skin, too, is a frequent associate of capillary pulsation. There is no radial pulse more characteristic than that of aortic regurgitation of cardiac type. It is abrupt and jerking, but collapses quickly during diastole. This is accentuated by raising the arm, so as to augment reflux. The impression communicated to the finger is of exceedingly low tension, but this is actually not the case, at any rate, so long as the ventricle retains fair driving power.

A sphygmographic tracing shows an abrupt line of ascent, an acute angle at the apex, and an abrupt line of descent. The abruptness of the upstroke varies with the strength of the ventricle, and the abruptness of the downstroke with the amount of incompetence. With a failing ventricle, or with a leaking mitral valve, the contrast becomes much less marked, though the aortic incompetence may be as great as, or greater than, before. Delay of the pulse, *i.e.*, a lengthened interval between the systole of the ventricle and the radial pulse, may be found, which varies directly with the amount of aortic regurgitation. Irregularities of the pulse are far less common and less conspicuous than in mitral disease. They do occur, but, as a rule, only in advanced stages, or when the struggle has been unequal from the outset. The arterial wall may be, and, in early cases, usually is normal; but, in the later stages, the abrupt fluctuations of arterial pressure are apt to make them thick, rigid, and inelastic, and ultimately tortuous, as in the arterial type. Auscultation of a large artery, such as the femoral, commonly yields a double souffle. In health, and with light pressure, one hears a single snapping sound, which is due to sudden tension of the arterial wall, and which heavier pressure converts into a definite souffle. In aortic regurgitation, not only is this souffle heard, but a second also, due to the retrograde current of blood passing the site of pressure.

Venous pulse, though rarely seen, needs passing mention, It is a feeble post-systolic centripetal wave, best seen in the lax veins on the back of the hand, and is propagated through the dilated arterial capillaries.

Præcordial prominence is more likely to occur in the cardiac than in the arterial type, because the former may have originated at an early age, when the ribs were still pliable. It is striking how small the amount of hypertrophy or dilatation may be in women and in children. Some degree of dilatation is desirable in aortic regurgitation, for increased force alone cannot compensate the loss : increased volume can. The apex beat is usually energetic, and displaced downwards and outwards : dilatation rounds and enlarges its area. With extreme hypertrophy, systolic recession of the third and fourth left intercostal spaces is often seen, and the impulse is like a

ball hardening under the hand, and apt to produce osseous vibrations of the ribs, which simulate a thrill, systolic and apical. Diastolic thrills at the base are very rare. I have felt but three, and, in each instance, the circumstances suggested the likelihood of a ruptured valve vibrating freely in the regurgitant stream. With the higher degrees of enlargement, the shock of diastolic recoil is often readily felt over the heart. In such cases, too, one usually finds, in the left axilla, some evidence of partial compression of the left lung.

The diastolic murmur of aortic regurgitation commences with diastole, and usually lasts throughout it, but exceptionally is arrested before diastole is complete. It is due to reflux under two forces, aortic recoil, and diastolic aspiratory suction of the left ventricle. Consequently, it is loudest at first, and gradually diminishes in intensity, and disappears as equilibrium is established between the forward and the backward current in the left ventricle.

In the cardiac form, the murmur is usually soft and blowing, soft because the forces that produce it are not strong enough to generate energetic vibrations, and blowing because it gradually dies down as the ventricle fills. Speaking generally, the softest murmurs are heard when there is no associated systolic murmur, perhaps because the narrowing of aortic stenoses increases the velocity of the refluent stream. Very rarely, it is harsh or rasping, and audible at a distance, or musical: this is generally due to an extensive laceration of the valve. The murmur is habitually high pitched. The site of maximum intensity is usually at or about the third right chondro-sternal articulation, *i.e.*, the point at which the aorta approaches most nearly to the chest wall. In quite a number of cases, however, it will be found at the same level to left of the sternum in the near neighbourhood of the pulmonary valves: this seems to be due to displacement of the heart to the left by stretching and elongation of the aorta. But for its situation and rhythm, this murmur has really nothing in common with that of pulmonary regurgitation. The latter is a murmur of feeble strength and small volume, and propagated only an inch or so downwards from its point of origin. Its cardiac associations are right-sided, not left-sided. There is no Corrigan pulse, nor capillary pulsation;

no double souffle in the arteries, and none of the functional troubles of aortic regurgitation.

An aortic regurgitant murmur is sometimes thought to be of pulmonary origin, but there is little possibility of mistaking a pulmonary regurgitant murmur for one of aortic origin. Occasionally the murmur is best heard at the apex of the heart. The chief lines of conduction are two, down the sternum to the ensiform, and along the fourth and fifth left ribs to the apex. In the latter case, it may disappear *en route*, and again become audible at the apex. Lastly, it is not unknown for the murmur to be conducted to the mitral area in the back, but not by the mitral route. It is difficult to assign each of these anomalies to its appropriate cause: but there is no difficulty in appreciating the variability of the factors that produce them. The more or less obliquity of the aperture that permits the reflux must be a condition of prime importance, and along with this the localisation of the lesion, the more or the less, to one or other valve. Nor is this all, for whatever direction is imparted to the regurgitant stream at its commencement, it will meet in the left ventricle the forward stream from the left auricle that will largely determine the point or points at which it impinges on the heart wall.

A murmur is very rarely absent. It is at times so soft as to need keen ears to detect it; but, from my experience of the teaching of students, I should say that, taken all in all, it is the least elusive of left-sided murmurs, although an abnormal location may cause it to be misinterpreted.

I can testify to at least three cases in which an undoubted aortic regurgitant murmur disappeared. In each instance there was other valvular mischief due to endocarditis, so that there was little reason to regard them as cases of functional aortic insufficiency. It is not difficult to imagine such a degree of change in valve, or vegetation, as to effect this result.

It is frequently laid down, without reservation, that in aortic regurgitation, the second sound is lost, being replaced by the murmur, and that, when a second sound is heard, it is due to closure of the pulmonary valves. This is far from being invariably true, for it is quite common to hear a normal aortic closure sound followed by a distinct low diastolic whiff, the valves meeting but not accurately.

It is exceptional to hear the murmur of aortic regurgitation unaccompanied by other murmurs, at base or apex. The diastolic, and usually presystolic murmur at the apex demands special attention.

From bedside evidence alone, one would accept without hesitation Austin Flint's recognition of a diastolic murmur at the apex of the heart, in the absence of organic disease of the mitral valve, in many cases of aortic regurgitation. As to the frequency of the murmur, there is considerable divergence of opinion ; for example, Gibson of Edinburgh has failed to convince himself of its existence, while Thayer, on the evidence of Osler's clinic at the Johns Hopkins Hospital, considers that it may be found in half the cases of aortic regurgitation. My own records of 173 cases of aortic regurgitation give a total of 46, in which mitral stenosis, structural or functional, was diagnosed during life. Of these 46 cases 7 came to autopsy, and in each case organic mitral stenosis was found. In spite of these figures, I have a fixed belief in the existence of such a functional murmur, that it is decidedly exceptional, and that a liberal estimate of its frequency is once in 20 cases. I have heard it in a case of rupture of the aortic valve, in which the previous health of the patient was beyond question. I have seen on several occasions a loud and long presystolic murmur, present in the out-patient department, disappear at once on rest in the wards, and, again, such a variability with posture as to be scarcely compatible with structural disease of the mitral valve. Its production is commonly assigned to vibration of the large curtain of the mitral valve between two streams of constantly varying strength, roughly parallel, but on opposite sides of the valve, viz., the onward flow from the auricle and the regurgitant current from the aorta. To my mind, the suggestion that the mitral valve is forced into the position of virtual obstruction by the aortic reflux deserves more consideration than the contemptuous rejection that it frequently receives. It is, at least, possible that, now and again, the regurgitant current, which is strongest at the beginning of diastole, may float the large mitral curtain into such a position as to obstruct the inflow of blood from the auricle, that is strongest at the end of diastole. The very infrequency of the murmur tempts one to look for causal conditions that are far from immutable.

It is of something more than academic importance to decide whether the murmur indicates organic obstruction, or no. Yet, as a rule, we shall have to content ourselves with little more than a mere guess, based on the most imperfect evidence. If the typical large collapsing pulse is present, organic obstruction is improbable, and contrariwise the smaller the pulse, the greater is the likelihood of its presence. The quick thrust of the apex-beat, the short snapping first sound, and the presystolic thrill should be more conspicuous in the organic, than in the spurious form, and the murmurs should be more characteristically loud and rumbling. Much enlargement of the right heart, with marked accentuation of the pulmonary second sound, and origin of the aortic lesion in endocarditis, would all strengthen the case in favour of true obstruction. It cannot be said that anyone of these features constitutes an absolute criterion, but the *ensemble* would, at least, demand consideration.

The physical signs in the heart and arteries in the *arterial* type present some points of distinction from those already considered. The arteries are, from the first, rigid and tortuous, and stand out like rigid tubes on the temples and arms, the tension is usually higher than in the cardiac form, the collapse of the vessel less obvious, and it is said that double crural souffle can be elicited less often. The abruptness of rise and fall of the sphygmographic curve is less marked, and the apical angle less acute. The frequency and the extent of dilatation of the aorta, with its contingent consequences, tend to be much increased. The condition may be evidenced by an extension of percussion dulness, or skiagraphically by the shadow of a pulsating tumour, in the second space to right of the sternum. The heart is, as a rule, more dilated than in the cardiac form, because, at the same time, as the resistance in the arteries is greater, the supply of blood by the coronary arteries is less. It is very rare to find the diastolic murmur unaccompanied by a systolic murmur, because the rigidity of the valves almost necessarily causes some degree of obstruction ; or, failing this, a systolic murmur is induced by dilatation, or atheroma of the first part of the aorta. The diastolic murmur too is usually harsher than in the cardiac type.

The course of the arterial type is much more exposed to

accidental complications than is the case with the cardiac type. Angina pectoris, for example, is common, and not infrequently the immediate cause of death. Renal disease is apt to show itself in uræmia, acute pulmonary œdema, and albuminuria. The condition of the cerebral arteries may lead to hæmorrhage, or thrombosis, while the brittleness of the aortic valves is a standing menace of embolism.

Early evidence of failing strength of the left ventricle, in any case of aortic regurgitation, is afforded by diminution in size of the pulse. Later there may be irregularity, due sometimes to the occasional interpolation of a reinforcing contraction of the left ventricle, and intermission as well. Attacks of palpitation have a like significance. Even *in extremis*, aortic patients generally prefer recumbency, in the unconscious effort to aid the flow of blood to the brain. Mitral patients prefer the erect posture, so as to get the blood away from the brain. Orthopnœa, in aortic regurgitation, indicates that the mitral valve is also affected.

Aortic regurgitation, most commonly of all valvular lesions, terminates in sudden death, from paralysis of the left ventricle in diastole, following some undue effort, for which the intracardiac circulation cannot supply the full demand of the heart muscle. It is vain to look for the explanation in mere degeneracy of the heart muscle, which occurs commonly, apart from aortic regurgitation, without any special liability to sudden death.

Other occasional causes of sudden death are cerebral hæmorrhage, or embolism, and angina. The nature of these causes shows obviously that sudden death in aortic regurgitation will be more common in the arterial than in the cardiac form. In either type, however, death by gradual cardiac asthenia is the rule.

It is only possible to discuss in the briefest outline some of the chief points that govern prognosis. The all important question is the type of disease, whether cardiac or arterial. Excluding cases due to rupture of a valve, the course of which has already been considered, cases of endocarditic origin often have a long period of latency, and even after unmistakable symptoms have appeared. With care to avoid any undue strain on the heart, it is remarkable how long compensation

may be maintained. I have seen several cases among the well-to-do, in which the lesion has been present for 20 years or more. In hospital practice, too, the lesion is conspicuously better borne by women than by men. The arterial form of aortic regurgitation, on the other hand, is but one manifestation of a general and progressive degeneration, involving, as a rule, the coronary arteries as well, so that compensation cannot last long. It is usual to regard aortic regurgitation as the most serious of left-sided lesions, and this is undoubtedly the case, but, if we had to do only with cases of endocarditic origin, the gravity would be much diminished. Aortic lesions have at any rate this advantage over mitral, that the pulmonary circulation is comparatively unembarrassed. Whatever may be the origin of the aortic regurgitation, the general health of the patient, the ability and the willingness to rest the heart must be taken into account. The extent of the lesion and the amount of regurgitation must be estimated, as far as possible, and here valuable information is supplied by the pulse. Much, too, depends on the degree of compensatory hypertrophy, and the presence or absence of symptoms of circulatory disturbance. Angina pectoris is a grave complication, indicating, as it does, the combination of coronary disease and muscular degeneracy. Irregularity of the pulse is of evil omen, and persistent intermission nearly always means the beginning of the end. The condition of the arteries and kidneys has much importance. The question has been much debated as to how far the outlook is influenced by the association of other valvular lesions. I have no doubt whatever that, *ceteris paribus*, both mitral stenosis and mitral regurgitation increase the gravity of the case. It is true that mitral stenosis may diminish one of the forces tending to produce dilatation of the left ventricle, but this small gain, if actual, is purchased at the price of embarrassment of the pulmonary circulation. Similarly mitral regurgitation may supply a safety-valve against over-distension, but at the same cost. It is much more difficult to speak with any degree of certainty as to the association of aortic stenosis. In itself, it is seldom a lesion of serious moment, and it is possible that, when insufficiency exists as well, it may stand as a bulwark against the excess energy of the left ventricle, and also diminish the amount of regurgitation.

Treatment, more particularly medicinal treatment, is concerned in aortic regurgitation, more with the relief of concomitant troubles than with direct assistance to the heart, such as can be afforded in mitral regurgitation.

In cases of sudden rupture of a valve, every means must be used to avoid stress. Absolute rest in bed, such measures as will ensure restful sleep, and gentle laxatives are imperative. It would be a grievous mistake to urge on a heart that is near being hopelessly embarrassed by digitalis, or by the persistent use of other stimulants. The heart must be left to work out its own salvation.

If discovered in the course of, or after an acute infectious disease, the sheet-anchor in treatment, again, is rest, whatever other subsidiary measures may be employed; in the case of aortic regurgitation such rest is peculiarly necessary. After acute endocarditis the liability of the heart to dilatation is greatly increased, and the possibility of sudden diastolic arrest is no mere phantom.

Rest in bed, for at least six weeks, should be insisted on, followed by a like period of modified recumbency. If a full measure of hypertrophy is to be secured, a further period of not less than six months should be rigorously devoted to quiet convalescence; and if, on return to gentle work or gentle exercise, there is the least sign that the heart is unequal to the task, the period must be still further prolonged.

When compensation is established, attention to general hygiene is all that is needed. All the causes of cardiac strain, fatigue and excitement must be avoided, and among these should be numbered the abuse of alcohol, tea and coffee, and tobacco. Diet should be moderate, and not unduly nitrogenous, but otherwise unrestricted in kind. A daily regular action of the bowels must be assured.

In arterio-sclerotic cases some benefit may be derived from prolonged employment of the iodides; their depressing effects being averted by combination of nux vomica.

If signs of transitory irritability of the heart appear, alkaline bromides, valerianates, or Hoffmann's anodyne, may be tried; transitory weakness may require strychnine, ether, or arsenic.

Digitalis is contraindicated only in the *early* stages of aortic insufficiency, because by slowing the heart and

increasing peripheral resistance it augments reflux without other simultaneous benefit.

Prior to the final breakdown, the complicating troubles that may have to be met are very numerous. The distressing substernal ache of subacute aortitis may be relieved by a succession of flying blisters, by cupping, or by the actual cautery over the aorta. Angina pectoris must be met by morphia, or amyl nitrite, and recurrences warded off by rest, nitroglycerine, and iodides.

Attacks of urgent dyspnœa are usually of toxic origin, either renal or alimentary, and are most difficult to relieve. Milk diet, free action of the bowels, inhalations of oxygen, and, sometimes subcutaneous injection of morphia, would seem to be indicated: injections of strychnine and ether are quite ineffectual. Acute pulmonary œdema is likewise of renal origin, and is of such grave moment that immediate venesection should be resorted to.

Insomnia is apt to defy the whole range of hypnotics: the safest are perhaps chloralamide, trional and paraldehyde; but the most effective is morphia, which must be given with a due regard to the state of the kidneys.

The terminal heart failure may be either arterial, or venous in character. In the former case, the heart must be sustained against syncopal seizures by nourishment, and by such stimulants as strychnine, ammonia, and ether, perhaps with added belladonna or strophanthus.

When the troubles are those of venous back pressure, purgatives and digitalis are called for, as in mitral disease, withdrawing the digitalis as soon as relief is obtained.

ON GOUT AND ITS CAUSATION.

By I. WALKER HALL, M.D.,

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GOUT is a form of subacute or chronic toxæmia. The exciting cause may be the toxin of micro-organisms acting directly, or indirectly, through a condition of lowered bodily resistance, or an auto-toxin resultant from deficient digestion or metabolism. Woods Hutchinson justly remarks, however, that careful inquiry, directed towards the elucidation of *evident* causes, such as localised dental or other suppurations, intestinal fermentation or putrefaction, mental worry or overstrain, will furnish valuable indications for treatment in quite a number of cases. Ignorance of the exact exciting cause is responsible for much of the empiricism which obtains to-day.

It is, nevertheless, probable that the symptom complex, which we term gout, may result from the action of one or more causes. Acute outbreaks, at all events, follow diverse types of irritation, and since similar morbid tissue changes may result from a reaction against diverse types of toxins, it is probable that like functional alterations, or those metabolic changes which are unaccompanied by gross tissue lesions, may be the response to poisons which, to some extent, differ in constitution.

Although we may reflect sadly upon the comparative paucity of ascertained facts, as contrasted with the number of hypotheses, and may remember that the extent of our knowledge herein is limited to a few experiments upon the deficient metabolism of proteids, upon the altered and delayed metabolism of nucleins, upon the changes in the alkalinity of the serum, and the lesions occurring in connective and parenchymatous tissues, we must not forget that, associated with some of the more recent views, there is a number of ascertainable facts which, although now somewhat neglected, may become exceedingly important when other fields of pathological chemistry are opened up.

In this preface to a review of recent publications, I do not pretend to include all the aspects of this wide subject; it will be sufficient, if I confine myself to those points which demonstrate the necessity for extending the objects of research, which condemn the futile limitation of inquiry to uric acid and its congeners, and which exhibit the effect of detailed researches into the intermediary processes of metabolism upon the treatment of gout and the so-called "goutiness."

As it is thus unnecessary to discuss the older well-known theories, we may, after a passing mention of the uric acid hypothesis, at once proceed to a consideration of the newer standpoints.

Uric acid cannot be regarded as a distinct factor in the causation of disease. We have still much to learn concerning its circulation in the tissues, and its capacities for combinations therein. We need also further information as to its manner of excretion from the human body, and its varying behaviour in individuals presenting different metabolic powers. Under properly arranged conditions, the rate and extent of its excretion may be utilised for the interpretation of the personal tolerance for exogenous nucleins, and for the elucidation of some of the intermediary stages in metabolism; but as an etiological entity, uric acid must be definitely discarded. It is high time that every practitioner made a point of fully educating the public in this respect.

Since a concrete and demonstrable factor as the cause of morbid changes is more likely to gain acceptance than a vague "humour" or mysterious toxin, it is but natural that endeavours should have been made to discover bacteria specific for the disease. Amongst others, Holger Trautner regards the bacillus coli communis as the cause of gout. According to him, the organism produces a reducing substance, which results in the passage of an excess of xanthin into the tissues. Chalmers Watson, in the course of some important and interesting studies upon the effect of excessive meat intake upon the glands and tissues of animals, reports the presence of tissue changes in animals, which suggest the action of micro-organisms as their cause. Ringrose Gore contends for direct intestinal infection. There are, certainly, sufficient intestinal bacteria to indict. Even if their identity and number

are determined, there is much to learn of the possibilities of growth in such a motley crowd. Of the products of their growth, we are only now accumulating data. Different species of the intestinal bacteria produce secretions, or excretions, which restrict the growth of other species, and sometimes of their own, while the intestinal mucosa, in all probability, also pours forth secretions, which act as fixators for the bacteria, or their products. Hence the possibilities of the intestinal infection in gout depend in part upon the species of bacteria present, and in part upon the integrity of the secreting cells of the alimentary tract. The extent of the resistance offered by the body, is thus the chief factor in the hindrance of the passage of the bacteria, or their toxins, through the alimentary mucosa. We cannot yet suppose a specific organism for gout, and the general metabolism plays a greater part in regard to the action of accidental, or exceptional intestinal toxins than is generally acknowledged. At the same time, it must be conceded that hereditary deficiencies in digestive faculties, or idiosyncrasies of metabolic functions, may permit the formation of exceptional toxins, or decrease the resistance to the products of the ordinary intestinal bacteria.

We are really not yet in a position to discuss this bacterial theory of gout. Except that adequate clearage of the intestinal contents diminishes the gouty symptoms, we have not much evidence to go upon. Before we can advance with safety, we must know more of the intermediate stages of metabolism. Many of the most interesting works of the last few years have been directed to this end.

From Fischer we have learned that the proteid molecule can be split up into amino-acids, di-amino-acids, aromatic amino acids, nitrogenous derivatives of the benzene ring, pyrimidine bases, pyrrolidine derivatives, cystin and ammonia. During proteolysis, the amino-acids exist in groups, such as glycine and leucine (glycyl-leucine), two leucine radicles (alanyl-leucine), &c. These combinations Fischer terms polypeptides, and some of them he has been able to produce synthetically. It is possible to maintain the healthy weight, and nitrogenous equilibrium of animals, by feeding them upon these polypeptide products of proteolytic digestion which no

longer give the biuret reaction. These products consist chiefly of combinations of amino-acids (or poly-peptides), but contain also some other nitrogenous substances. The formation of the amino-acids, &c., from peptone, is said to be due to a special intestinal ferment, erepsin. Erepsin is, however, also present in all the tissues of the body, and its action is especially pronounced in the renal tissues; thus its action is not specific for the alimentary tract. Since, however, ferments exhibit a reversibility of action, it is possible that the ferment, which *in vitro* is able to split up the albumoses, may, when acting in the intestine or other tissues, form albumoses synthetically from amino-acids.

These advances in physiology suggested investigations into the amino-acids, in their association with the output of uric acid in gouty patients, for it appeared probable that glycocoll can be split off from all the amino-acids, and that this process plays a great part in the organism, since the body always has glycocoll at its disposal for coupling or combination purposes, as, for instance, in the well-known cases of hippuric and glycocolic acids. Such a probability is supported by the results of Embden and Reese's and Lipstein's work, which shows that amino-acids are present in all urines to about one per cent. of the total nitrogen output. Ignatowski found amino-acids present in large amounts in the urine of gouty patients, and in a few other diseases, but only traces were observed in the urine of healthy individuals. From some observations of my own, commenced in 1904, upon the urine of gouty patients, and extended later to that obtained from patients suffering from other diseases, and also to that from healthy and diseased children, I have determined the presence of glycocoll itself in about 70 per cent. of the cases. When published elsewhere, the details will show certain differences between the urines of different diseases, but they confirm the conclusion that normally a certain amount of glycocoll escapes through, or is eliminated by, the renal filter.

In this connection Kionka suggests an attractive but, as yet, not widely accepted hypothesis. When a solution of glycocoll is added to a neutral solution of dialkali-urate, the appearance of the (acid) monoalkali-urate is hastened, the action being more pronounced when the sodium salt is used. Urea, on the

other hand, inhibits the formation of the acid salt, but loses its powers when glycocoll is added to a solution of neutral dialkali-urate and urea. If glycocoll is present in gouty urine, it may be supposed that glycocoll is also present in the tissue fluids, and thus the precipitation of urates may be favoured. Normally, glycocoll is almost entirely transformed into urea in the liver, but, if the urea ferment action of the liver is depressed, then more glycocoll will be present in the blood stream, and the uric acid may be thrown out of solution. Since hepatic deficiency is generally admitted in the gouty, diminished destruction of uric acid and of glycocoll may go hand in hand. It is certainly curious that hepatic stimulants are the medicaments which are most useful in gout. Local uric acid depositions may arise from the presence of excessive amounts of glycocoll in bruised or damaged cartilage, and from the precipitating action of the glycocoll upon the uric acid of circulating blood. Aberhalden and Schittenhelm, however, deny the presence of glycocoll in damaged cartilage, and state that the results obtained by Kionka and Frey are within the limits of possible errors in the methods used. In addition, the results of Embden, and of the writer, show that the glycocoll excretion is by no means limited to gouty patients.

Shearer suggests that an excessive quantity of CO_2 in the arterial blood is a condition which leads to gout, arterio-sclerosis, chronic interstitial nephritis, &c. Exercise has, consequently, a beneficial effect upon those subject to gout, because it increases the exhalation of CO_2 from the blood. But, as Hare suggests, exercise increases not only the exhalation, but also the production of CO_2.

Hare supposes that a progressive carbonaceous accumulation is a common factor of disease, and leads, under varying conditions, to various paroxysmal affections, such as acute articular gout, the paroxysms constituting the relief from the carbonaceous excess by the increased combustion implied in the accompanying pyrexia.

The views of Woods Hutchinson, which constitute a good working hypothesis, are fully set forth in the subjoined abstracts.

Almagia has demonstrated the existence of glyoxylic acid in gouty urines. Its significance is not yet determined. The

same worker observes that normal cartilage possesses physical or chemical absorption powers for urates, but does not possess any capacity for the breaking up of uric acid.

v. Loghem shows experimentally that increased alkalinity of the tissue fluids leads to deposition of urates, while increased acidity lessens the tendency to uratic deposits.

May we not take it that, in spite of the numerous hypotheses —which demand considerable time for confirmation or refutation—our knowledge of the intermediary metabolism in gout is gradually increasing? It is a long cry to the specific causal factor, but there is no basis for the widespread despondency which exists. We have suffered enough from our ignorance of pathological chemistry. Concurrently with advances in our knowledge of this subject, old hypotheses disappear, and there is little scope for new ones until we have accumulated more data.

Even now, apart from any considerations of etiology, the knowledge attained is capable of practical application. Hepatic insufficiency accounts for many of the symptoms of gout. Hepatic stimulants form the best medicaments. The accurate adjustment of food to the capacities of the intestinal mucosa and the liver, is one of the best forms of treatment. Since 1902, when I first suggested this procedure, I have made many experiments upon gouty patients, and have reported general betterment and diminution in the number of acute attacks. Von Noorden and Schliep have recently published good results from a similar type of treatment in cases extending over two years. The purins in the food, and the purins in the urine, are taken as the indicators. The individuals are given food containing known quantities of purin substances, and their urine is estimated for total purins. Purin containing foods are not entirely withheld; the amount is determined from time to time, in order that the patient may take just as much as he can properly metabolise, but no more. By this means, nutrition is kept at the highest pitch, and the tissues are not flooded with more proteid and nuclein substances than they can easily deal with. The results are striking in regard to the freedom from acute attacks, and the improvement in the general well being.

Schmoll and Fenner have obtained good results from the administration of thyminic acid, and the treatment certainly merits further trial. But in experiments, which I have at present in hand, I do not find that the improvement is at all associated with any change in the uric acid excretions, a result which also applies to citarin.

Other forms of treatment are included amongst the abstracts.

The relation of the purin bodies to gout is still somewhat obscure. Recent researches have shown the existence, in various organs, of ferments which break down guanin and adenin to xanthin and hypoxanthin, and other ferments, or the same acting reversely, which build up the hypoxanthins to uric acid. It is significant that hypoxanthin is being perpetually produced by muscular tissues, and adenin and guanin by more distinctly nucleated tissues, such as the spleen and thymus. That a small amount of uric acid is of synthetic origin is possible, but the quantity thus produced is so small as to be almost negligible in normal conditions. Whether this moiety is increased in disease has not yet been determined. Uric acid must not be ruthlessly omitted from our calculations, although the prominence given to it by many is not supported by the facts at disposal. The attitude of patient accumulation of new chemical data is the one which must be necessarily assumed, and though the pace of progress towards a completed knowledge of the ætiology of gout is somewhat slow, yet it is comforting to reflect that the facts which are daily being ascertained are in the meantime shedding light upon other processes of disease.

PATHOGENESIS.

Gout and the Bacillus Coli Communis. Trautner, H.: *Nord. Med. Arkiv.* Afd. II. Heft, 2, No. 7, 1905.

One of the first manifestations of gout is a mucous colitis. During periods of constipation in the gouty, the uric acid output is increased. The bacillus coli communis produces a reducing substance, which is transformed into xanthin and uric acid during its passage through the body. The bacillus coli communis is the initial agent in gouty affections.

Influence of Diet on the Growth and the Functions of the Tissues. Chalmers Watson: *Lancet*, Vol. I., p. 509, 1905.

Different diets are associated with demonstrable histological changes in the various organs and alterations in their functional capacity.

Reasons for Abandoning the Uric Acid Theory of Gout. Chalmers Watson: *B.M.J.*, 1905, Jan. 21.

There is an infective element in the disease; uric acid is the feature which gives the inflammation its specific character. The chief source of infection is the alimentary tract, and an injudicious dietary acts mainly by its influence on the bacteria present in the digestive tract.

The Uric Acid Delusion and the Prevention of Gout. Woods Hutchinson: *Journal of the Amer. Med. Assn.*, 1904, p. 1685, Dec. 3.

Gout may be defined as any mild, or chronic, intoxication occurring in an individual of a medium grade of resistance and resulting in the deposit of uric acid, or the urates in the tissues or urine. In other words, it is a symptom name, pure and simple. The first thing to do is to find out the particular cause of the intoxication in each individual case. No class of cases will better repay the time spent in an elaborate and exhaustive search in this regard. Auto-intoxication, due to perversion of normal metabolism arising from mental worry, grief, or overstrain, or from intestinal fermentation or putrefaction, may occur. External infection from suppuration about the teeth, or an acne, may furnish sufficient cause.

Tophi form, in the gouty, in response to any intoxication, because the cells have sufficient resistance, so to speak, to die in opposing its action, and allow their nucleins to break up and form urates. The calcareous concretions may be regarded as a protective process, analogous to the formation of shells, &c., in the invertebrates; the process there consisting of the deposition of lime salts in cells already saturated with uric acid and urates. Three of our most serious chronic intoxications, namely, rickets, rheumatism, and gout, are associated with a marked disturbance of the normal deposition of bone. The whole series of peri-arthritic changes in gout are simply the symptoms of slow chronic intoxication, with local necrosis, at points of least vitality.

Amino-acids in Gouty and other Urines. A. Ignatowski: *Zeitschr. f. Physiolog. Chemie*, Bd. 42. Lipstein, A.: Hoffmeister's *Beiträge*. Bd. 7, S. 527, 1905.

Amino-acids in Urine, G. Embden: *Verhand. d. Kong. f. inn. Med.*, XXII., 1905, Wiesbaden. Embden and Reese: Hoffmeister's *Beiträge*, Bd. VII.. S. 411, 1905.

Glycocoll Theory. Kionka and Frey. *Zeitschr. f. Exp. Path.*, Bd. II., 1905, pp. 1–60.

Kochmann found that excessive meat feeding produced in dogs degenerative changes in the liver and kidney. Walker Hall obtained similar changes after injecting hypoxanthin into rabbits. Kionka finds the same in mice. Although anatomical changes are not apparent in the livers of gouty men, it is very probable that functional damage results from over-eating of meat.

The addition of glycocoll to a solution of (neutral) dialkali-urate hastens the appearance of the (acid) monoalkali-urate. This action is more marked with the sodium salt. Urea, on the contrary, strongly inhibits the formation of the acid salt, but when glycocoll is added to a solution of the (neutral) dialkali-urate and urea, the latter loses, to some extent, its powers, and the monoalkali-urate is deposited. Ignatowski states that

glycocoll is present in gouty urines, and, if this is true, it is reasonable to suppose that glycocoll is also present in the tissue fluids of the gouty individual, and so the precipitation of uric acid is favoured. Glycocoll is, as a rule, entirely transformed into urea by the urea forming ferment of the liver. Kionka thus formulates the hypothesis that gout arises (1) from functional changes in the liver—a depressed urea-ferment action ; (2) a deficient uric acid excretion by the kidney—possibly from the changed uric acid combinations in the blood. These pathological conditions may be "hereditary" or "acquired" from over-eating, alcohol, lead, &c.

Glycocoll in solution dissociates more H − ions, than OH + ions. In the presence of alkalies, this acid character is more pronounced, so that it tends to throw the uric acid salts out of solution. The restraining influence of the urea upon the precipitation of uric acid from solutions, is due to its basic nature.

When cartilage is bruised, or damaged, a considerable amount of glycocoll is formed. In normal cartilage, glycocoll cannot be demonstrated. When blood, rich in uric acid, circulates through damaged cartilage, the presence of glycocoll favours precipitation of the urates. This would provide a possible explanation of the formation of tophi.

Under normal conditions, uric acid may pass through a glycocoll stage, on its way to urea. In the gouty individual, the glycocoll may not be entirely transformed to urea, and its excess in the tissue fluids may lead to uric acid deposits. Perhaps an excess of uric acid and an excess of glycocoll in the tissue fluids go hand in hand.

Curiously enough, those medicaments, which have gained most favour in the treatment of gout, are those which increase the quantity of bile without increasing the amount of bile acids, and which are excreted in combination with glycocoll—for instance, salicylic acid combines with glycocoll, and is excreted as salicyluric acid ; benzoic acid combines with glycocoll to form hippuric acid.

The Role of Glycocoll in Gout. Aberhalden and Schittenhelm. *Zeitschr. f. exper. Path.*, Bd. II., October, 1905.

The work shows that the methods employed by Frey, in order to isolate glycocoll from cartilage, yield errors which would quite account for the amount Frey obtained, and thus there is no proof that glycocoll is present in injured cartilage.

Carbon Factor in the Genesis of Gout. Shearer, February 11. *Lancet*, 1905.

Excess of CO_2 in the arterial blood is a condition which leads to gout, arterial sclerosis, chronic interstitial nephritis, &c. Exercise has a beneficial effect upon those subject to gout, because it increases the exhalation of CO_2 from the blood.

Hare, *Medical Record*, June, September, 1905, believes that a progressive carbonaceous accumulation is a common factor of disease, and leads, under varying conditions, to various paroxsymal affections (such as acute articular gout), most of which result in relief from the carbonaceous accumulation.

The Relation of Gout to Obesity and to Diabetes. Falkenstein : *Fortschritte d. Medicin*, 1178, 1904.

From a study of 200 cases, gout is considered to arise from defective formation of hydrochloric acid in the stomach. Dietetic treatment is not

of great moment in these conditions. The main necessity is to increase the activity of the digestive juices, and so augment the oxidising capacities of the cells. Heredity plays a great part in these disorders of metabolism, and descendants of gouty parents frequently suffer on the one hand from diabetes, or on the other, from obesity.

Ætiology and Pathology of Gout. Futcher, I. B.: *Journal of Amer. Med. Assn.*, p. 1680, December 3, 1904.

Heredity, malt liquors, excessive food with insufficient exercise, deficient food with bad hygienic surroundings, and lead, are all predisposing factors. Gout is due to disturbance in the metabolism of the "endogenous" and "exogenous" purins. We have not yet sufficient evidence to warrant us in abandoning the theory that the manifestations are in large part due to disturbances in uric acid metabolism. The balance of opinion is in favour of the view, that the excess of uric acid in the blood is due to deficient excretion on the part of the kidneys.

The Formation of Uric Acid in Gout and the Causes of its Precipitation in the Tissues. Schmoll, E.: *Arch. gén. de Méd.*, 81, T. 11, and *Journal Amer. Med. Assn.*, 1905, p. 1348.

Uric acid is combined with thyminic acid in the blood, thymic acid being derived from the nucleinic acid, which also gives origin to the uric acid. In gout, some of the uric acid is formed synthetically, and this portion is without a corresponding quantity of thymic acid with which to combine, and it is accordingly precipitated in the tissues. The administration of 100 grammes of casein was followed by a marked excess in the excretion of uric acid, and the excess quantity is attributed to synthetical formation.

Uric Acid, its Influence in Gout. Ranson, C. C.: *Medical News*, 1905, Vol. 86, No. 10.

No evidence that uric acid causes gout or, in fact, any other disease. The uric acid output during an acute attack is very similar to that during an attack of infectious disease. Acute attacks are generally associated with gastro-intestinal disturbances. Toxic material acts upon susceptible tissues. The leucocytes appear in numbers during the tissue reaction, and, unable to cope with the toxin, they are destroyed. The nuclein of the cell is oxidised to uric acid, and the result is the gouty joint.

Tilden Brown (Discussion at Harvard Medical Society, New York City, March 25, 1905) considers a low excretion of urea to be an excellent and pathognomonic symptom. The urea may run so low at times as to lead to a suspicion of renal disease. The rhythm of urea excretion constitutes a warning as to the approach of gout, and may be of service for prophylactic purposes, or for the commencement of treatment with the object of lessening the severity of symptoms (viz., extent of toxic action as manifested by destruction of proteid, &c.).

The Elimination of Endogenous Uric Acid in a Case of Chronic Gout. Laird, A. T.: *American Medicine*, 1905, vol. X., p. 315.

The amount of endogenous uric acid output was subnormal, and presented marked variations. The leucocyte counts were normal, the phosphorus output and the acidity were both low.

Pathology of Gout. M'Donnel Campbell: *Lancet*, 1906, p. 1110.

The Relations of Gout and Rheumatism. Courtois-Suffit et Beaufume: *Gazette des Hôpitaux*, 1905, p. 927.

Cases occur in which gouty changes co-exist with chronic deformities, due to chronic rheumatism. The diagnosis is considerably aided by means of radiographs.

On the Theory of Gout. Walter G. Smith: THE PRACTITIONER, 1906, January.

Incidence of Gout in U.S.A., and in New Communities. Duckworth, Sir D.: *Internat. Clin. Phila.*, 1905, 14, IV., 80.

Zur pathologischen Anatomie der Gicht. Rosenbach: *Virchow's Archiv*, 1905, S. 359.

Comparative Pathology of Gout. Watson Chalmers: *Tr. Med. Chir. Soc., Edin.*, 1904, 23–64.

Bone Changes in Gout, confirmed by Röntgen Rays. Vormann: *Deutsche mil. aertz. Ztschr.*, 1905, 34, p. 161.

CASES.

Poor Man's Gout. Debove: *Journ. des Prat.*, 1905, September 9.

Three cases in cab drivers. One man had a gouty inheritance, had always disliked meat, and was a moderate drinker. From 32 to 50 years of age, he had three acute attacks of gout every year. Every joint in his body was gouty. Hands and feet were ankylosed. Calf and thigh muscles were atrophied. The arteries were atheromatous; there was a loud cardiac murmur. Polyuria, but no albumin. Potassium iodide, lemon juice, raw meat, and uncooked fruits gave the best results. Colchicum was useless.

Lithæmic Gangrene. Rosewater, N.: *New York Med. Journal*, 1905, p. 170.

A gangrenous condition of a phalanx, which progressed favourably, when purin yielding substances were withdrawn from the dietary.

Gout. Remarkable Case. Byrom Bramwell: *Lancet*, 1905, Vol. I., p. 1340.

A man, aged 52, presented enormous tophaceous masses over the metacarpals, the olecranon, the patellæ, and the heads of the tibiæ and fibulæ. Discharging ulcers were present on the hands and the feet, and yet the patient's general condition was good. The patient's habits had never been such as to lead him to contract gout. He had developed it twenty-eight years previously while living in the wilds of Australia.

Gout in a Child Seven Years old. Lunts, R.: *Med. Obozr. Moskau.*, 1904, 62, 300. *Deutsche med. Wochenschr.*, 1904, No. 33.

The Pharynx of Gouty Individuals. Heckel: *Presse thérap.*, 1905, II., 1–7.

Der experimentelle Gicht Tophus. Von Loghem: *Centrb. f. inn. Med.*, 1905, 26, 143; and *Deutsches Archiv f. Klin. med.*, Bd. 85, p. 416, 1905.

The deposit of urates is due to an increased, rather than a decreased alkalinity. Administration of acids favours solution of uric acid salts.

Chronic Tophaceous Gout. Bramwell: *Clin. Stud. Ed.*, 1904–5, III., 377.

Subcutaneous Fibroid Nodules in Gouty Persons. Duckworth, Sir D.: *St. Barth. Hosp. Reps.*, 1905, 40, p. 15.

Gouty Joints. Weiss, E.: *Heilkunde*, Berlin, 1905, p. 299.

Diphtheria in a Patient 79 years of age, with subsequent freedom from old gouty symptoms. Birt, I.: *Lancet*, 1905.

TREATMENT.

Treatment of Gout. Woods Hutchinson: *Journ. of Amer. Med. Assoc.*, 1904, p. 1688, Dec. 3.

Alkaline laxatives are useful in checking the acid process of fermentation in the alimentary canal, and in removing putrescent materials before they have time to give off their poisonous matters to the blood.

Intestinal antiseptics, such as salicylates, calomel, guaiacum, phenacetin, menthol, &c., directly prevent fermentation.

Simple alkalies reduce the acidity of gastric digestion, and perhaps, to some extent, directly neutralise those toxins which are neutral in reaction.

Colchicum, the iodides, acetates and nitrates act as direct eliminants.

Diet must be suited to each individual case, so as to reduce intestinal putrefaction to the minimum, and, at the same time, to furnish thoroughly adequate nutrition. Gouty patients should drink plenty of water.

Iodipin Injections in Gouty Conditions. Schuster: *Deutsche Med. Zeitung*, No. 39, 1904.

10–15 grms. of 25 per cent. light coloured iodipin is injected in the neighbourhood of the lesion every other day, until a total quantity of 150 to 200 gms. has been employed. If pain and swelling result, the use of an ice-bag soon allays these conditions. The local improvement is manifest in a few days. The lymphoid tissues are stimulated, and a hyperleucocytosis results.

Treatment of Gouty Rheumatism. Tessier and Roque: *Le Mouvement Médical*, 1905, June.

In addition to the usual treatment, the skin should receive much attention. When exercise is impossible, the skin should be rubbed daily with flannel on which eau de Cologne has been sprinkled. Alkalies should not be taken for longer than ten to fourteen days without interruption, as they tend to produce anæmia. They may then be replaced by valerianate of ammonia, or sodium iodide.

Quinic Acid in Gout. Weiss, J.: *Medical Press and Circular*, 1905, July, p. 5.

A month's administration of urosine (lith. quinate, 40–75 grs. per day) in the spring is able to suppress those troublesome gout attacks generally experienced in the summer, without producing untoward effects. The tablets are best dissolved in water, and taken at meal times.

The Gouty Diathesis. Arany, S. A.: *Lancet*, 1905, Vol. I., p. 600.

Thyroid extract in gout is rather dangerous. It may produce very serious heart symptoms, even if very carefully administered.

Lithæmia. Johnson, F. M.: *American Medicine*, 1905, p. 68.

Plenty of alkaline water to drink is advocated. When calcium oxalate crystals are numerous, dilute nitro-hydrochloric acid is indicated. A catarrhal cystitis is often present, and this should be treated by washing out the bladder with 1 per cent. solution of formalin, or silver nitrate, in a half saturated solution of boracic acid.

The Elimination of Uric Acid. Fenner, R.: *Lancet*, 1905, Vol. II., p. 19.

Thymic acid is a solvent for uric acid. The administration of from four to seven grains, thrice daily, at meal-times, to number of cases of acute and chronic gout, produced increased excretion of urates, and marked improvement in the general condition.

The Action of Uresin on Uric Acid and its Salts. Spassky, L. S.: *Russkij Wratsch.*, No. 13, 1905.

After the administration of citric acid, utropin, urotropin citrate, lithium citrate and uresin, Spassky determined the quantitative excretion of nitrogen, uric acid and oxalic acid. Urotropin does not influence the nitrogen output, but appears to act as a solvent for the uric acid. The other preparations lead to a greater excretion of oxalic acid, and the nitrogen excretion is slightly changed.

The Neundorf Cure for Gout. Winckler: *Deutsche Medizinal-Zeitung*, 25, Nos. 31, 32, 33 and 34.

Neundorf is a small bathing resort not far from Hanover. Mud and sulphur baths are used extensively, and a careful dietary imposed.

Citarin bei Gicht. Merkel, S.: *Deutsche Arch. f. klin. Med.*, 1905, 84–265.

Citarin bei Gicht. Friedeberg: *Centrlb. f. inn. Med.*, 1904, 25, 1169.

Citarin bei Gicht. Floret: *Die med. Wochenschr.*, 1905, 31, 147.

Citarin bei Gicht. Mayet: *Lyon Med.*, 1905, p. 2211.

Treatment with Urol and Urocol. Fuchs, R.: *Heilkunde*, Berlin, 1905, S. 104.

Regimen for Eczematous Conditions in the Gouty. Petit, C.: *Rev. d. Pharm. Méd.*, Paris, iii., 27, 13.

Value of Baths in Gout. Weiss, E.: *Therap. Monatsch.*, 1905, 19, p. 292.

Gout in Relation to Spa Treatment. Luff, A. P.: *Lancet*, 1905, p. 1668.

L'Hygiène du Goutteux. Mathieu, A.: Paris, 1905, Masson.

La Goutte. Krakauer, J.: Berlin. Klemm. 80 pp., 1905.

Treatment of Gout. Debove: *Journ. de Méd. int.*, Paris, 1905, 9, p. 294.

Diet in Gout. Marcuse, J. *Wien. med. Presse*, 1905, 46, p. 1641.

Medicinal Management of Gouty States. Prevost, C. A. W.: *International Therap.*, New York, 1905, Vol. i., p. 233.

Treatment of Gouty and Rheumatic Neuritis. Sikes, A. W.: *Clinical Journal*, 1905, p. 253.

Treatment of Gout. Minkowski, O.: *Deutsche med. Wochenschr.*, 1905, March 16.

Treatment of Gout. Von Noorden and L. Schliep: *Berliner klin. Wochenschrift*, 1905, October 9.

Treatment of Uric Acid. Goodhart, J. F.: The Practitioner, 1906, January.

Treatment of Uric Acid Conditions. Gribbe, A. W.: *Australasian Med. Gazette*, 1905, October 20, p. 531.

Formaldehydtherapie bei der Gicht. Therapie der Gegenwart. Brugsch, T. 1905, December.

PURIN BODIES.

Uric Acid and Purin Metabolism.—The formation and breaking down of uric acid in organ extracts. Schittenhelm, A. *Zeit. f. Physiolog. Chemie*, Bd. 45, pp. 121 and 161, July.

Two separate groups of ferments are concerned in the metabolism of purin bodies; one hydrolyses and detaches the NH_2 group, the other oxidises

and breaks down the already formed uric acid. The hydrolytic ferment occurs in extracts of spleen, lung, liver, intestine, muscle and kidneys of cattle; the oxidising ferment is found only in the kidney, liver, and muscle. For the uric acid destroying ferment, the name "uricolytic" is proposed. A sufficiency of oxygen is necessary for the changes from purin base to uric acid; unless this occurs, the aminopurins progress to xanthin and hypoxanthin only, and not to uric acid.

Ueber die Harnsäurebildung in Gewebsauszügen. Schittenhelm, A.: *Zeitschr. f. Physiolog. Chemie*, Bd. 42, Heft. 3.

The tissues contain a ferment which is able to oxidise adenin, guanin, and nucleates of soda to uric acid. The oxidising ferment can be salted out of solution by ammonium sulphate. Alcohol markedly inhibits the action of the ferment.

Chemie der Spermatozoen. Burian, R.: *Ergebnisse der Physiologie*, Jahrgang III., Abt. I., 1904.

This important paper is most valuable for reference upon all the details of nuclein metabolism.

Fate of Uric Acid introduced into the System.. Ebstein and Bendix, *Virchow's Archiv*, Vol. 178, No. 3.

When uric acid is injected into the ear vein of a rabbit, it is deposited in the renal cells as spherical crystals. If both kidneys are extirpated, and large amounts of uric acid then injected, no microscopical changes will be found in the liver or joints.

Experiments with unicellular organisms, in order to determine which part of the cell has an affinity for the acid, yield negative results, since the animals, unlike vegetable cells, are extremely sensitive, and soon die.

If xanthin, hypoxanthin, or adenin is used, crystals will be deposited in the cells and lumen, but, with guanin, the distribution is more uniform over the entire kidney.

Synthesis of Uric Acid in the Organism. Burian, R.: *Zeitschr. f. phys. Chemie*, Bd. 41, 1905, Feb. 11.

Extracts of liver and spleen contain an oxidase which can convert hypoxanthin into uric acid. Working with the liver of the ox, Burian found that, in the absence of oxygen, this conversion cannot take place.

Uric acid may be formed from free, or combined purin bases present in the extract.

The extract has the capacity of again decomposing the uric acid which has been formed.

Apart from the oxidative formation of uric acid in liver, there is no other synthesis of this substance in the liver.

The muscles during rest, by means of hypoxanthin oxidase, change the stored-up hypoxanthin to uric acid, and deliver it to the blood. As there is no uric acid in muscles, this change must take place just as the hypoxanthin passes from the muscle fibre into the surrounding lymph. A part of the uric acid is again changed into hypoxanthin. The quantity of hypoxanthin in the muscle remains constant; hence there is a constant formation of new hypoxanthin in the muscle. This hypoxanthin is increased while the muscle is at work, and at the same time the amount of purin bases leaving the muscle is also increased. The fact that hypoxanthin, under this condition,

leaves the muscle, without being changed into uric acid, is probably explained by the fact that the xanthin oxidase cannot act well on account of the poverty of oxygen.

Siven (*Finska Lak. Handlingar*, Dec., 1905) finds that increased output of endogenous uric acid does not follow increased muscular action.

Beiträge zur Kenntnis des Purinstoffwechsels beim Menschen. Bloch, B.: *Deutsches Archiv. f. Klin. Med.*, Bd. 83.

Truth and Poetry concerning Uric Acid. *Journal of Amer. Med. Ass.*, 1905, Jan.

Uric Acid and Diet. F. C. Eve: The Practitioner, Dec., 1905.

Uric Acid Excretion in Gout. Eschenburg: *Münch. med. Woch.*, Bd. 52, p. 2263, 1905.

Experiments upon the influence of flesh free and flesh rich food, together with 50 grammes of alcohol per day, did not yield very satisfactory results. It did not appear certain that the alcohol led to any increased excretion of uric acid in young people. Citarin was also without effect.

Destruction of Uric Acid by Animal Organs. Almagia, M.: Hoffmeister's *Beiträge*, Bd. 7, S. 459, 1905.

In the horse the liver possesses the greatest powers to destroy uric acid. The appearance of glyoxyllic acid is associated with the breaking up of uric acid.

Pfeiffer (Hoffmeister's *Beiträge*, Bd. 7, S. 464, 1905) shows that human kidneys are also able to break up uric acid.

The Absorption-Coefficient of Cartilage for Uric Acid. Almagia, M.: Hoffmeister's *Beiträge*, Bd. 7, S. 466, 1905.

RHEUMATOID ARTHRITIS.[1]

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THAT we have still very much to learn about diseases which implicate the joints is a self-evident proposition, but it is also true that we have much to unlearn. There is no other group of maladies concerning which our ideas are clothed in so antiquated a garb. The very names by which they are spoken of have come to be so loosely used that they have lost almost all scientific value, and have become stumbling blocks in the path of progress. Nor is the reason of this far to seek. The parts involved are largely external, and within easy reach of the simplest methods of examination. As a result, lesions of the joints have been widely studied, and written about, since the days of Hippocrates and Galen, and, in the works of ancient authors, the clinical features of no other disease are so vividly betrayed as those of podagra.

In the course of the centuries it came to be realised that the ancient categories did not suffice and that subdivision was necessary. From the comprehensive group, "arthritis," first gout, and afterwards rheumatism, had to be separated off, and, in due course, it was recognised that there were diseases, affecting many joints, which were neither gouty, nor rheumatic in their nature, and the main divisions were again subdivided.

As a result of the growth of knowledge along such lines, undue attention has been concentrated upon the articular phenomena of these maladies, the only features which they all share in common. Only by slow and painful steps did it come to be realised that joint lesions are, for the most part, local manifestations of systematic disorders, and that endocarditis and pericarditis are no mere complications of rheumatic fever, but are as much primary manifestations of that disease as the more obvious articular troubles.

These latter, as the study of rheumatism in children has taught us, may indeed occur in very trifling forms, as compared

[1] Paper read before the Medical Society of London.

with the cardiac and other visceral lesions, and may even be wholly wanting in any individual acute, or subacute, attack.

In this connection, the history of our knowledge of gonorrhœal rheumatism, which is perhaps more complete and more scientifically adequate than that of any other member of the group, offers an excellent illustration of the line of progress referred to.

Even in the middle of the 19th century, the notion was prevalent that what we still call, for want of a better name, gonorrhœal rheumatism was merely rheumatism, modified in its clinical features by intercurrent or antecedent gonorrhœa, although some held even then that it was a disease *sui generis*. Later on, when the points of difference came to be more fully realised, it was suggested that it was a nervous arthropathy excited, in a reflex manner, by urethral irritation. We now know that the arthritis is only one of a group of local manifestations of gonorrhœal septicæmia, and is due to the invasion of the articular structures by the gonococcus.

It has, moreover, come to be recognised that the majority of arthritides are due to infective processes. That tubercular, pyæmic, as well as gonorrhœal arthritis are due to micro-organisms is established beyond all doubt, the infective nature of acute rheumatism is no longer questioned, and even for gout a bacterial origin is advocated by some. It is also known that a variety of specific organisms, such as the pneumococcus, the diplococcus meningitidis, micrococcus Melitensis, and the unknown organisms of several infectious fevers, are capable of setting up inflammation of joints.

When all these have been put on one side, and also such lesions as the arthritis of bleeders and the nervous arthropathies, there still remains a cluster of cases, the residue of the heap, from which the better defined morbid entities have, from time to time, been sifted out, and these are too often spoken of, and written about, as if they constituted one definite malady, to which malady various and different names are assigned, such as rheumatoid arthritis, osteo-arthritis, arthritis deformans, and many others in various tongues.

Here multiplicity of nomenclature bears witness to vagueness of ideas, and, before we can hope to make any further

conspicuous progress, or to lay the foundations of a sounder knowledge of the conditions so designated, we need to clear the ground of the structures which still cumber it, and to start afresh on new lines.

Consider for a moment to what extent the views of the public, and even of our profession, on such matters are dominated by traditions handed down to us from the past.

How deeply rooted is the notion that dietary restrictions are the main requisites in combating articular diseases in general. How many of us still act as though we believed that gout, rheumatism, and what we call rheumatoid arthritis are really much of a muchness, and should be treated on similar lines.

The public is largely responsible for this, for it has formed its own ideas on these subjects, and amateur advice freely supplements and criticises medical prescription.

Rheumatoid arthritis has formed the subject of not a few set discussions of recent years, and we are once more met together to discuss it this evening, but I would maintain that no such discussion can prove fruitful of results unless we start by forming some fairly clear idea of what we are going to discuss.

There is a clinical congeries of cases which we, in this country, are wont to speak of as examples of rheumatoid arthritis, and there is a set of anatomical changes met with in joints, which have been carefully studied, and which form a well-characterised anatomical picture, including fibrillation and erosion of cartilages, osteophyte formation, eburnation of bones, and the like, which have been adopted as representing the anatomic features of the clinical disease.

However, we are beginning to realise that the clinical and anatomical categories referred to do not fit each other. That in many cases, known clinically as rheumatoid arthritis, the osteo-arthritic lesions are not present, and that, on the other hand, these latter lesions are present in cases which are not included in the clinical group.

Hence it may happen that the kinds of cases present to the mind of one participator in such a discussion as this may be quite different from that which presents itself to the speaker who follows him.

I would venture to suggest that we should all endeavour, for this evening, to lay aside all preconceived notions as to the existence of such a definite disease as the rheumatoid arthritis of text-books, and that each should strive to contribute something of what experience has taught him as to groups of cases, which would usually be referred to that category, specifying, as clearly as possible, the particular class of cases which is referred to.

There is a disease, which implicates many joints, which is neither gout nor true rheumatism, which is a specific malady, so far as uniformity of clinical features can be taken as a criterion of specificity, and which bears the stamp of an infective disorder.

Owing to its slow course, and the profound changes which it sets up in the joints and muscles, it is productive of a deplorable amount of deformity and crippling. Yet it is a disease which runs its course in time, long as that course may be, although the sequelæ which are its legacy may be worse than the disease itself.

It is a febrile malady, and a systemic one, as witness the profound anæmia, and even cachexia, which it often brings in its train, the local sweating, and also the peculiar brown smeary pigmentation of the skin, which is so characteristic of severe cases, and to which attention was first called in a paper read before this Society by Dr. Kent Spender. In the same paper stress was laid upon the rapidity of the pulse, out of proportion to the febrile disturbance, which is an almost constant feature, and may long outlast the febrile stage.

Yet visceral lesions are rare and seldom prominent. Among such, the occasional supervention of an acute nephritis calls for mention, and pericardial adhesions are found *post mortem* in cases, in which no acute pericarditis has been observed during life.

It is hardly necessary to refer to the characters of the joint lesions which will be familiar to all, such as the fusiform swelling, which gives an impression of thickening of the joint capsule, such as is actually present. The lesions are strikingly symmetrical, and, in severe cases, all the joints of the body tend to be implicated in turn, the hips usually last of all. Considerable diagnostic value attaches to the affection of the

cervical spine and of the temporo-maxillary joints, which seldom escape altogether. From gout and acute rheumatism, these joints are practically immune, but they are sometimes attacked by gonorrhœal rheumatism.

Stress must be laid upon the extreme atrophy of muscles which is seen in its most pronounced form in severe cases. This atrophy may, or may not, be purely secondary to the long continued inflammation of the joints, but here it is certainly unusually pronounced, and its importance is great, because the contracture of the wasted muscles is largely responsible for the crippling which develops after the active stage is past.

The pain varies in different cases. It may be the most distressing feature of the acute stage, or, on the other hand, may be comparatively slight in cases which in other respects are equally severe.

This is mainly a disease of earlier adult life, and far commoner in females than in males. In children it is decidedly uncommon, but, for my own part, I can see no valid reason for thinking that the cases occurring in children, of what is often spoken of as Still's disease, are examples of a distinct malady. Enlargement of the spleen and lymphatic glands is not confined to cases in children, nor, in my experience, is it by any means a *constant* feature of the disease as seen in them. Certainly, as Still's cases show, a fatal ending is much commoner in children than in adults.

Cases are occasionally met with which have developed at a late period of life, 60 or upwards, but the decade 20–30, appears to be the period of chief liability. Sometimes the symptoms develop shortly after parturition, and one is tempted to assign a group of cases to some obscure infection during the puerperium. Careful inquiry, however, usually fails to reveal any septic focus, and the point of entry of the infection, assuming that such exists, remains obscure. Any depressing influence appears to favour the onset, and among such menorrhagia calls for special mention. Opportunities so seldom occur of examining the joints of adult subjects, during the acute stage, that it is not wonderful that the materials for a description of the morbid anatomy of the disease are scanty. In children, thickening of the joint

capsules is the most conspicuous change. The cartilages are found intact, or are only pitted at their edges by the pressure of the swollen synovial fringes. It is rather a periarthritis than a true arthritis. It may be objected, with reason, that there is some doubt whether the disease of children is the same as that seen in adults, but one may point to the very similar changes, observed and described by Dr. Hale White, in the case of a young woman, who died, during the acute stage, of an intercurrent disorder. There was in addition a conspicuous rarification of the articular ends of the bones, which radiography has shown to be a constant feature of such cases. In cases of long standing, in which death occurs long after the acute stage is over, the cartilages may be gone from the rigid joints, and some osteophytic outgrowths may be found, bony ankylosis may even be present, but such changes do not appear to develop in the active stage of the periarthritis.

It is one of my chief aims, in these remarks, to emphasise the distinction between the active stage of the disease and the sequelæ which it leaves behind; for, even during the stage of sequelæ, there is apt to be a progressive crippling and incapacity due to the increasing contracture of the atrophied muscles. Yet in the two stages, the indications for treatment are entirely different. In the acute stage, our main object should be to shorten, so far as it is in our power, the course of the malady, for, the shorter its course, the less will be the permanent injury to the joint structures and muscles, and the less the resulting deformity.

During the stage of sequelæ, on the other hand, it must be our aim to minimise the crippling by judicious local measures.

It is a striking fact that, in the most severe cases, in which disability compels repose from the beginning, the duration of the active stage is not infrequently shorter than in milder cases, in which the patient has been at no time compelled to take to bed. This suggests that absolute rest of the inflamed joints is of great importance in the early stages, and I fully believe that, if such rest could be enforced in all cases at the commencement, we should see many fewer examples of extreme crippling than we do at present. It follows that, if

this is true, active local treatment, bath-place courses, and the like, valuable as they are in the stage of sequelæ, are contra-indicated in the acute stage, and experience bears out this inference, which is of supreme practical importance.

The conspicuous part played by muscular contracture in the production of deformities, and the fact that such contracture is secondary to the great muscular atrophy, which is a feature of the disease, suggest the advisability of massage as a preventive measure. This may be carried out, even in the acute stage, provided that the massage is strictly limited to the muscles, and that the joints are left severely alone.

We all know how difficult it is to secure the systematic carrying out, over long periods, of plans of treatment, which are attended by no immediate benefit, and are merely insurances against future contingencies; but where such massage *is* systematically done the muscular atrophy is certainly kept in check, and the ultimate gain well repays the expenditure of trouble and patience. Where there is little atrophy there will be little contracture deformity, but the actual damage to the joints themselves may, nevertheless, produce no slight crippling.

It is very generally recognised nowadays that a diet suited to a gouty patient has no special value in such cases, and that our aim should rather be to give a generous diet, in which the several main food factors are fairly represented, and adapted to the special conditions of the case, such as the amount of febrile disturbance.

Drug treatment has no chance, unless persisted in irrespective of immediate results, but it may be mentioned that in some cases aspirin proves very useful for the relief of pain, and should be given a trial, but here, as in other conditions, whilst its action is conspicuous in one case, in another, apparently very similar, this drug proves quite useless. In view of the high opinion of the value of guaiacol carbonate held by some, it should be given a trial in any case, always remembering that the results claimed for it are only to be looked for if it be taken for long periods.

It is necessary to allude to the question of a possible relationship of the disease under discussion to true rheumatism, by which I mean the disease which culminates in an attack of

rheumatic fever. At the onset, the diagnosis from sub-acute rheumatic fever may be difficult, or even impossible, especially as the symptoms may be intermittent at first, and may only assume a more fixed character later on. In case of doubt the patient should be put to bed, and treated as suffering from sub-acute rheumatism, and the result of such treatment will often settle the point. Again, cases are met with in which an attack of rheumatic fever leaves behind it a periarticular thickening which closely simulates that of the more obstinate disease, but which may disappear in the course of a few weeks, or months. Lastly, there are rare cases, in which active cardiac lesions, apparently rheumatic, are developed in association with what are indistinguishable from the joint lesion under discussion.

On the other hand, the collective study of many cases carries conviction that the two diseases are in reality wholly distinct; that each runs its own course, and has its own peculiar manifestations. The development of endocardial lesions in the rheumatoid cases is not to be expected, even when the disease retains its activity over a very long period, and, when they develop, they tend to throw doubt upon the diagnosis. Whilst it must be acknowledged that puzzling exceptions occur, experience supplies the strongest reasons for believing that each is a specific malady, *sui generis*; and, in such circumstances, general impressions carry more weight than particular instances.

In thus speaking of the disease under discussion as a specific malady, I would not seem to exclude the possibility, or even the probability, that there are cases diagnosed as belonging to this group which are not due to the same specific cause as the bulk of the examples in which the symptoms are most characteristic, but which may be due to pneumococcal, gonococcal, or streptococcal infections.

Even the diagnosis of rheumatic fever is probably not always correctly made, and some of the cases so diagnosed might perhaps be referred, with greater accuracy, to the pyæmic group.

What then are we to call the malady which forms the subject of the above sketch? Names it has in abundance, and even in excess, but no one of these is limited to it alone,

and all are equally used to designate a malady so essentially different as the hip joint affection of elderly people. The art of inventing such terse names as gout and rheumatism is a lost one, and we cannot desire that the subject should be still further complicated by the introduction of fresh terms when there are already too many. Probably we could not do better than to agree among ourselves that this disease, and this disease alone, should be called *rheumatoid arthritis*. It may be objected that it is not rheumatoid, and is rather a peri-arthritis than an arthritis, but few medical terms could justify themselves in face of such criticism. Gout is not a "drop" and rheumatism is not a "flowing." There is a real objection in that the name is cumbrous, and that the public is beginning to refuse to be troubled by the qualifying adjective, and to speak of "arthritis" pure and simple. This makes confusion worse confounded.

If this limitation of the use of the name rheumatoid arthritis were accepted, the term "osteo-arthritis" might be restricted to these conditions in which the characteristic series of anatomical changes, already referred to, occur in the joints.

From the clinical standpoint, such cases fall into a number of well-defined groups, which have only their morbid anatomy in common. It is indeed a reasonable view that the osteo-arthritic lesions are in no way specific, or due to any one morbid cause, but that they are rather a set of degenerative changes which may develop, *de novo*, in joints, and especially in those which have received injury, or, again, in joints which have been the seats of disease, and especially of long standing disease. This is, perhaps, the easiest explanation of the presence of such lesions in gouty joints, in the damaged joints of bleeders, as well as in articulations, which have been the seat of obstinate attacks of gonorrhœal rheumatism, or rheumatoid arthritis.

The hip joint affection of elderly people affords an excellent example of a well-defined clinical group of cases in which such changes are present, for it was, upon a careful study of the morbid anatomy of this lesion, that the classical description of osteo-arthritis was originally based. Closely allied to

it, is the very similar affection of the corresponding joint of the upper limb, the shoulder.

Cases in which the temporo-maxillary joints alone are the seats of osteo-arthritis form another small but well-defined group.

The knee-joint trouble of women, which develops about the time of the menopause, is a common malady. Slight discomfort felt in kneeling or in going downstairs persists and becomes aggravated, until all walking may cause pain, and, in the worst cases, the knees may become so gravely damaged that the patient is unable to walk at all.

On palpation, even in the earliest stages, when no swelling of the affected joints is apparent, there is felt on depressing the patella while the joint is in movement a peculiar fine scrunch, and, in later stages, the bones are felt to be lipped, or obvious osteophytic outgrowths are palpable, or, again, a peculiar resistant swelling, which one is inclined to associate with hypertrophy of the synovial fringes.

If I may be pardoned for a digression, I would point out that auscultation of joints is a clinical method which has not received the attention which it deserves, and which would, I believe, repay careful study and a comparison of the sounds heard with the conditions revealed at operations, or at post-mortem examinations. Only by such comparison can any degree of accuracy be attained, but the opportunities are few. However, as a mere clinical exercise, auscultation of joints is of some interest. Various sounds are heard in diseased articulations, which can be classified fairly accurately, such as the fine crackle, which one connects with swelling of the synovial membrane, the peculiar scrunch, above referred to, which probably indicates fibrillation and erosion of cartilage, and a scrape which is strongly suggestive of the movements of extensive surfaces of bared bone upon each other. These sounds are quite distinct from the gross crackling, audible to those around, which may be yielded by joints with which there is practically nothing amiss.

To return to the trouble in the knees, although other joints may be similarly affected in such cases, the outlook is in no way so gloomy as in cases of rheumatoid arthritis. The progress of the trouble is usually slow and it is often arrested,

so that the joints may cease to cause any serious inconvenience. In severe cases, however, they become so much disorganised that the patient is unable to walk.

The bony enlargements of the end joints of the fingers, known as Heberden's nodes, are perhaps the commonest of all the manifestations of osteo-arthritis, and such nodes often accompany more localised forms of the disease, such as the hip-joint affection and that of the shoulder joint. In some cases they appear to have a gouty origin.

In not a few cases the osteo-arthritic changes implicate many joints, and assume the form of a generalised articular disease, but the clinical features are the same as in more localised conditions, and when the finger joints are attacked, as is almost always the case, the swelling is limited to the immediate neighbourhood of the joints, is clearly due to osteophytic outgrowths, and has none of the fusiform character of the periarticular thickening of rheumatoid arthritis. This is clearly the "nodosity of the joints" which Haygarth described, in 1810, in what is rightly regarded as the original account of the disease or diseases under discussion.

So far as my experience goes, articular lesions such as these are never developed in the course of rheumatoid arthritis, but have their distinctive character from the onset. For long standing cases, in which osteophytes are developed around joints which have been the former seats of rheumatoid arthritis, these are rather sharp spicules of bone than nodular masses, and, in the majority of cases, the distorted and partially dislocated articulations show no bony outgrowths at all.

In some cases of multiple osteo-arthritis there is generalised brawny swelling of the fingers, which may render the diagnosis doubtful, but the Röntgen rays reveal the familiar changes in the ends of the bones and set all doubt at rest.

No less characteristic than the appearance and feel of the affected joints, is the distribution of the lesions, which is so well seen in the hands. Whereas in rheumatoid arthritis the fusiform swelling is earliest and most pronounced around the middle inter-phalangeal joints, in multiple osteo-arthritis the end joints are conspicuously enlarged, and often the middle joints also ; and the carpo-metacarpal joints of the thumbs are apparently seats of election of the morbid process.

In multiple osteo-arthritis, again, constitutional symptoms, including fever, rapid pulse and smeary brown pigmentation, are wanting. There is muscular atrophy, such as accompanies any long standing articular lesions, but it never aproaches to the extreme degrees seen in severe cases of rheumatoid arthritis, and muscular contracture has no share in the production of the deformities.

The prognosis is much less unfavourable, although progressive incapacity may be expected, and actual crippling may result in cases in which the joint lesions overstep their ordinary limits, and swelling of the synovial fringes and locking of osteophytes profoundly limit movement.

It is in this disease, and not in rheumatoid arthritis, that such drugs as iodide of iron and arsenic prove of service, if taken in the early stages and long persevered with ; bath-place treatment, hot air and radiant heat baths, and the like also contribute materially to improvement, and to the comfort of the patients.

Although multiple osteo-arthritis is a disease of later life, it sometimes develops at an unusually early age, and so these two diseases, multiple osteo-arthritis and rheumatoid arthritis, overlap in their incidence, both alike are far more common in women than in men, both produce prolonged disablement, and both are wont to attack the small joints of the hands and feet, of the spine, and of the jaw, but here the resemblance stops, and I believe that should the study of these maladies be approached *de novo*, in freedom from the trammels of tradition, it would never be suggested that they belong to the same morbid category.

In thus urging the essential distinctness of rheumatoid arthritis and multiple osteo-arthritis, I am advancing no new doctrine, but drawing attention to views which are shared with observers of large experience. Nevertheless, I have little expectation that I shall be able to carry conviction to all my hearers, for I know that not a few, for whose opinion I have great respect, are not prepared to admit that the evidence which can be brought forward is sufficient. Yet I am not the less confident of the correctness of the views expressed, and am confident that, in the long run, they will be generally accepted.

CASES WITH COMMENTS.

I.—GUMMA OF THE IRIS.

By H. WILLOUGHBY LYLE, M.D., B.S. (Lond.), F.R.C.S. (Eng.),
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[With Plate X.]

In September 1904, A. B., female, aged 26, presented herself in the out-patient department at the Royal Eye Hospital, complaining of pain in the right eye with indistinctness of vision. She said that the pain in that eye had been there for the past three weeks, and, during that time, she was unable to bear bright light in the affected organ. On examination, the upper eyelid was found to be somewhat œdematous, the lower eyelid was normal. The superficial conjunctival vessels over the globe were congested, and the deeper circumcorneal vessels were injected, more especially those situated opposite to the lower and outer quadrant of the cornea. There was a well-marked punctate keratitis on the posterior surface of the cornea, in its lower quadrant. The aqueous chamber was deep and contained a little blood below (hyphæma). The pupil was irregular, being horseshoe-shaped, with the two horns of the shoe pointing downwards and outwards. The iris, which was normally brown, was somewhat muddy in appearance, and, coming forward into the aqueous chamber from the ciliary margin of the iris, between what would be seven and nine upon the clock face, was a light-brownish yellow body, about the size of a very small pea, whose free margin was rounded, and whose base could be traced down towards the ciliary body. It was this small body which was pushing the iris upwards and inwards. On careful examination with oblique focal illumination and a strong magnifying glass, minute blood vessels could be easily seen running up over the tumour from its base. One of these had no doubt ruptured, and caused in consequence the hyphæma. The vision was taken with Snellen's test types; that in the right

eye was $\frac{6}{9}$, and that in the left (sound) eye was $\frac{6}{6}$. The tension in each eye was normal. A few drops of homatropine were instilled into the eye, and after a short time a further examination was made. The punctate keratitis now became much more evident, the dots were all small and about the same size. The pupil dilated irregularly, and the general appearance, as shown in the diagram, for which I am indebted to Miss Annie T. Barnard, M.B., B.S., Lond., was seen. On ophthalmoscopic examination, the lens and vitreous were found to be quite clear, the disc and fundus were normal, and there was no sign of any choroiditis. The media and fundus of the left eye were found to be quite normal. On further examination, the only other signs of syphilis in the patient were the presence of hard, painless, easily movable, amygdaloid glands, lying close to the carotid sheath on both sides of the neck. They were somewhat more numerous and larger on the left side, and there were also enlarged glands, just above the left clavicle. So far as could be ascertained, the post-nuchal and epitrochlear glands were not enlarged.

The important part of the patient's previous history was as follows:—She had always been healthy until she married. For six years previously, her menstruation had always been regular. Much to her own and her husband's disappointment she had never been pregnant. She had never noticed any sore about her genitalia, although two years before red spots appeared on her chest and back. These disappeared in about two weeks without treatment. One year previously, a sore appeared upon the left side of her tongue which also disappeared spontaneously. Three months before coming to the Royal Eye Hospital, she had "an ulcerated sore throat" for which for about a month she received treatment from a doctor. The case was diagnosed as one of gumma of the iris, due to acquired syphilis. The patient was given a course of mercury and potassium iodide, and atropine was instilled into the eye. In less than one month, the gumma had quite disappeared. During the treatment, the patient developed a large superficial ulcer on the left tonsil, which spread onto the soft palate. This disappeared in ten days through keeping the throat clear by the frequent use of chlorate of potash gargle, and increased doses of potassium iodide.

In June, 1905, the patient's husband accompanied his wife to the hospital, and admitted that he had acquired syphilis some six months before his marriage, but said that he was under treatment for two months, and, as he saw no signs of the disease, considered himself cured, and saw no harm in marrying.

In this case there are two important facts to which to draw attention, viz.:—(1) The diagnosis of the condition, and (2) the duration of the treatment of syphilis.

1. A true gumma of the iris is a somewhat rare affection. The gumma is usually single, and forms a brownish-yellow tumour with a very few blood-vessels seen upon it, and more usually appears at the ciliary margin of the iris, although gummata do sometimes occur at the papillary margin. Gummata, situated at either of these positions, generally set up a comparatively small amount of inflammatory reaction. A gumma of the iris must be diagnosed from a tuberculous nodule in the iris, for these nodules are, as a rule, avascular, and consequently no blood vessels are seen upon the surface. It must also be diagnosed from a sarcoma of the iris. "*Primary* sarcoma of the iris is a rare disease. Sarcomata of the iris are usually melanatic. They are at first small, and in numerous cases grow for months, or even for years, without causing vascular injection of the eye, or interfering with the mobility of the iris. They are frequently nodular, and always very vascular, their vessels being often visible to the naked eye. Pigmented and non-pigmented nodules may appear side by side." (J. Herbert Parsons.)

2. When a patient, suffering from syphilis, goes to his medical adviser for treatment, it is the duty of that gentleman to explain to him the nature of the disease, and point out the dangerous possibility of his becoming a source of infection to others. Moreover, it should be made clear to the patient that, in order to recover completely, so as not to be in a condition to infect others, he must submit to direct treatment for at least two years. Most authorities think that the symptomatic treatment is the best, but, at the outset, it is wise to advise a course of six months', more or less, continuous treatment. This treatment may be regulated by the presence, or absence, of symptoms, and the patient should be carefully examined for

PLATE X.

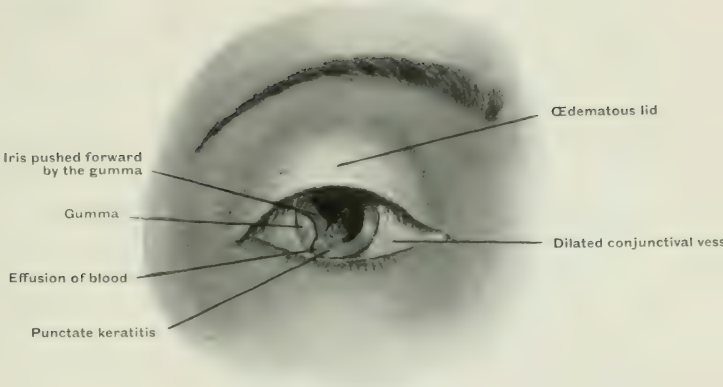
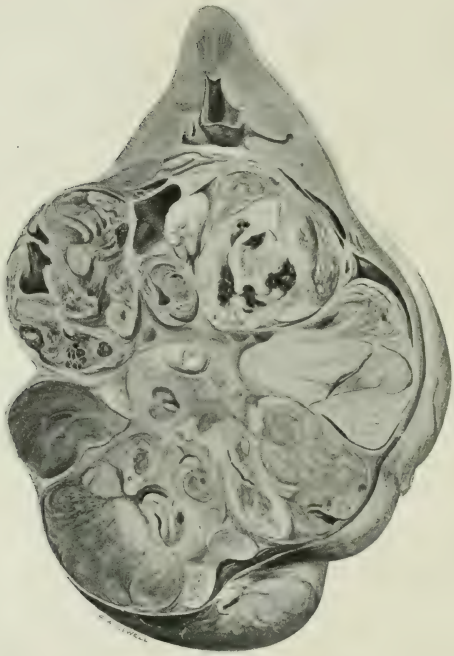

Œdematous lid
Iris pushed forward by the gumma
Gumma
Dilated conjunctival vess
Effusion of blood
Punctate keratitis

PLATE XI.



Mesial section of tumour showing the kidney substance above the new growth.

symptoms once every month or six weeks. In this way he may be kept under direct observation for at least two years, though occasionally longer treatment is required. Mr. Jonathan Hutchinson says it has been his rule for many years to insist upon the interval of two full years between the date of contracting the disease and marriage. It will be noted, in the case under discussion, that the patient's husband owned to having acquired syphilis about six months before his marriage, and, moreover, that he had had only two months' treatment. If, when he first consulted his doctor, the nature of his case had been explained to him, and the importance of the duration of the treatment before his projected marriage had been appreciated by him, it is possible that this unfortunate patient would not have contracted the disease and that consequently her eyesight would not have been endangered. She is still under treatment, for enlarged glands are still to be felt along the left side of the neck, although her mouth and pharynx are quite clear, and her eye has completely recovered. Her distance vision is $\frac{6}{6}$, and she reads No. 1 on the Jaeger test types perfectly well. Her chief complaint is that she has never had a child, and, in her own words, "we don't know where the fault lies." Needless to say, she has not been enlightened.

II.—AN UNUSUAL TUMOUR OF THE KIDNEY.

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[With Plate XI.]

THE notes of the case are briefly as follows:—The patient, a young married woman, aged 23, gave birth to a healthy child in the Rotunda Hospital, on August 4th, 1905.

She states that about five days afterwards she noticed a small lump that moved about in the left side of her abdomen; she said nothing about this for fear she might be kept longer in hospital. Three weeks later, she showed the lump to one of the doctors at the Rotunda, who told her it was a floating kidney and to come back again in a week if it was not better (I saw him and he told me that the tumour was

extraordinarily movable). She returned in a week, and as the lump had grown larger she was shown to Dr. Fitzgibbon, who sent her to me; I was away from home, and as she could not leave her baby then to come into hospital I did not see her until a week later, on September 30th, and those who had seen her the week before said the tumour had increased enormously in size during the week. She was admitted to Sir Patrick Dun's Hospital that day.

On Examination.—The left side of the abdomen was filled with a large tumour extending nearly to the middle line, the tumour was rather soft but still had a solid feel; two or three nodules could be made out on the anterior border, these were slightly tender to palpation, but beyond this the tumour was quite painless. With one hand in the loin, the tumour could be tilted slightly forwards, it did not move up and down during respiration. The urine was normal. She never had hæmaturia.

Thinking the tumour was probably of renal origin, the bladder was examined with the cystoscope, the left ureteral orifice (the side of the tumour) was very small, and although watched steadily for some minutes no movement or efflux of urine took place. The right ureteral orifice was about four times the size of the left, and urine was being discharged every few seconds, this rapidity of excretion being accounted for by a large draught of water given to the patient shortly before examination.

It seemed certain that the left kidney was not functionating, but in order to confirm this a Luy's segregator was passed into the bladder, and a separation of the urine from each kidney kept up for ten minutes, during which time 56 c.c. of urine was collected from the right side and 2 c.c. from the left, that from the right coming in normal gushes, from the left, an occasional drop. As there was the same amount of urea present in each specimen, it was evident that the 2 c.c. of fluid had leaked over from the right half of the bladder, and this was easily accounted for by the fact that the urine came so rapidly from the right side, that the collecting tube had to be quickly changed in order not to lose any of the fluid, and this caused a slight shake of the instrument on three or four occasions. From this examination, conducted painlessly

without even cocaine anæsthesia, it was quite certain that the patient was depending entirely on the right kidney, and therefore there was no anxiety about this point in advising removal of the tumour.

It seemed as if a hydronephrosis might easily explain the conditions present, but the tumour did not give one this idea on palpation.

On October 4, that is, seven weeks after the tumour was first noticed, an incision was made on the left side of the abdomen in the direction of the external oblique muscle, the internal oblique and transversalis muscles were divided in the direction of their fibres, and the peritoneal cavity opened sufficiently to admit the hand ; the upper and lower limits of the tumour were then made out, and it was thought possible to remove the kidney ; the skin and muscle incision was therefore extended backwards parallel to the last rib, the peritoneum was lifted up off the tumour, which was covered with enormous veins, as thick as one's little finger. The kidney in places was very adherent, and for some time it was doubtful whether its removal would be possible, but gradually the lower and upper poles were freed, and during this procedure the opening in the peritoneal cavity was frequently of assistance.

The tumour was eventually delivered from the wound, and the renal vessels and ureter, which was very small, were ligatured and the kidney removed. In spite of the large accessory blood supply, the patient lost but little blood and suffered surprisingly little shock.

The after history of the case was satisfactory and uneventful, the patient returning home three weeks after the operation.

The kidney weighed exactly three pounds; the renal vessels did not seem much larger than normal, the tumour apparently deriving its blood supply largely from the vessels surrounding it.

That a solid tumour of the kidney can grow so rapidly is a point of considerable interest—possibly the termination of pregnancy had some relation to the rapid growth of a pre-existing tumour.

Professor O'Sullivan, F.T.C.D., has kindly examined the tumour for me and reports as follows :—

The tumour was an encapsuled lobulated mass, roughly ovoid in shape, with a pointed apex. It measured, after being

some time in formalin, $9\frac{1}{4}$ inches in length, 6 inches in greatest breadth, and $15\frac{1}{2}$ inches in circumference in the middle. On cutting into it, it was seen that the pointed apex was formed by the kidney, which lay like a cap on the new growth and then divided and passed down on each side in a layer of kidney substance, which, becoming thinner and thinner, surrounded the growth for about half its circumference. In the upper part the growth was in many places separated from the kidney by two layers of firm white tissue with a space between them, which spaces communicated with the calices inside the kidney, and evidently represented compressed calices. Lower down the growth was still separated by a single layer of white tissue from the kidney substance, while further down still, the kidney substance disappeared, and the growth lay directly beneath the capsule which covered the whole tumour, kidney and new growth together. The hilus of the kidney, with the ureter and vessels, lay on the upper part of the posterior aspect of the mass and communicated with the compressed pelvis.

The growth itself, on section, showed a very diversified appearance. The central part contained a mass of firm connective tissue containing a few yellow soft nodules. Radiating out from this to the periphery were a number of large lobules, which made up the main mass of the growth, some of these were greyish white, uniform in texture, and colour. Others were yellowish, soft, and in parts broken down, while one was uniformly red, firm, and smooth. In others, again, these appearances were mixed together in all proportions, greyish, white, yellow, broken down and red hæmorrhagic areas alternating.

Portions were taken from various parts of the growth, and sections cut. The different portions showed great diversity of appearance. In some parts the growth was made up of papillary processes containing a core of hyaline connective tissue lined by one or two layers of low cubical epithelium, in others, were spaces lined by similar epithelium, some with papillary growths projecting into them, some empty, others filled with blood, while others again contained a homogeneous material which stained a light brown with Van Gieson's stain. Many parts were necrotic and showed no structure. In the central parts of the growth, the cells in some places filled the

spaces, while the lining cells still remained in regular order. In others, again, all order was lost, and the appearance was that of solid masses of epithelial cells with a few strands of hyaline connective tissue among them, such an appearance as is found in a soft cancer.

In the capsule, the remains of kidney substance could be detected in the parts nearest to the kidney. Further down they were entirely absent, and the capsule consisted of firm fibrous tissue with few nuclei or vessels.

Prize Essay.

THE CAUSES AND TREATMENT OF NOCTURNAL ENURESIS.

By V. CHASTEL DE BOINVILLE, M.B., Ch.B. (Edin.),
Liverpool.

The Causes of Nocturnal Enuresis.—The conditions which may lead directly, or indirectly, to this common and distressing trouble, especially in so far as it is manifested in children, are many and varied. Incontinence of urine during the hours of sleep is a symptom of varying incidence in many diseases, both of functional and of organic origin, and of local or of general distribution. It may occur as a result of peculiar dispositions, uncomplicated by any disease in the ordinary sense of the term, and may be inherited or acquired. It is intended here, for reasons which will hereafter become manifest, to classify the causes, so far as may be possible, in relation to the nerve mechanism involved in stimulating, or inhibiting, the act of micturition, and in relation to anatomical, or other defects, in the structures supplied by these nerves. For the sake of clearness, therefore, a passing note on the nerves connected with the urinary bladder and urethra will not be out of place.

The bladder is supplied by two distinct nerve systems, the spinal and the sympathetic. The former is represented by spinal centres in the 3rd and 4th, or most inferior, segments of the lumbar enlargement, and its nerve fibres enter the base and neck of the bladder by the 3rd and 4th sacral nerves of the sacral plexus on each side. The sphincter vesicæ is, therefore, supplied by these nerves. The sympathetic system consists of nerve fibres, which, intercommunicating in the pelvic plexus with each other, and with the spinal nerves, supply numerous branches to the upper part of the bladder. The reflex arc is established by sensory nerves, which enter the spinal cord in the usual manner, and communicate with the spinal centres in the lumbar enlargement. These nerve systems, while they are concerned in relaxing, or maintaining, the contraction of the sphincter and muscular walls of the bladder, may be in turn

inhibited, or stimulated, by nerve fibres of the upper neurone system, whose centres are in the cortex of the brain. Attention must also be called to the connection between the fibres of the sympathetic mentioned above, and the sympathetic system generally, which communicates in turn with the spinal nerves of a higher level, and apparently with certain of the cerebral nerves, derived from nuclei of the medulla. The muscular layer of the urethra is practically a continuation of that of the bladder, and is similarly innervated.

If we now discuss the causes of nocturnal enuresis, their classification is comparatively simple. Thus :—

Lesions and Anomalies in the Structure of the Bladder.—Weakness of the muscles may occur as a hereditary or congenital defect ; more frequently as part of a general debilitated condition, such as may be caused by anæmia, congenital syphilis, rickets, marasmus, febrile conditions, or prolonged illness of any kind. In childhood, the muscular tissues are always weaker than in manhood. In all cases of nocturnal enuresis in children this weakness is the most potent factor, and it largely accounts for the condition being so much more common in young patients than in those of adult life. In babyhood, up to the age of about twelve months, incontinence of urine is a normal condition, and persists, to a later age, as a nocturnal symptom.

Again, the sphincter muscle may be poorly developed, or there may be a congenitally wide urethral orifice. Under this heading, too, we must include a rare condition (two such cases have been reported by Davenport), in which the ureteral orifices are situated so low down in the bladder as to interfere with the action of the sphincter.

Lastly, the bladder may be congenitally small and incapable of accommodating the increasing quantity of urine during sleep.

Lesions Involving the Peripheral Terminations of Sensory Nerves.—Thread worms in the rectum, which at night may also wander out, and irritate the perineum or vulva, are, perhaps, the most frequent of all irritating causes.

So also vulvitis and caruncle of the vulva, phimosis in the male (more especially when it involves an inflammatory condition of the foreskin or prepuce), a constricted meatus

urinarius, wounds of the penis, hypospadias, urethritis, the habit of masturbation, and eczematous conditions of the perineum, or in the neighbourhood of the anus may be respectively responsible for the condition, while in adult males may be mentioned cancer of the penis or scrotum.

Among lesions affecting the nerve endings in the bladder itself should be mentioned tubercular and other forms of cystitis, stone, and irritative chemical combinations, such as uric acid, oxalate of lime, excessive urates or phosphates, albumen in large quantities, or the glycosuria of diabetes.

A distended bladder, as the result of taking diuretic fluids, such as tea or coffee, or too much fluid at the evening meal, or as a manifestation of diabetes insipidus, may be mentioned here.

The habit of lying on the back when asleep increases the tendency of children to wet the bed. This is generally attributed to the increased weight of urine pressing upon the trigone of the bladder; but the pressure exerted between the bedclothes and the sacrum may reflexly contribute to the accident.

In this category must be included also more remote and more general disturbances, which may reflexly inhibit the control of the bladder. Thus the pernicious habit of overloading the stomach at the evening meal, also flatulence of the stomach or bowels from any cause. A too hot bed, or more frequently, a too cold bed, may be to blame, and it should be remembered that the trouble is more common in the cold winter months. Children born in India may acquire the habit on coming to the colder climate of the mother country.

Lesions involving the Peripheral Trunks or Fibres of the Nerve Mechanism.—An overloaded rectum is a common cause, and its action may be attributed to the pressure exerted upon the sacral plexus of nerves, as well as upon the bladder itself. Pelvic tumours may in the same way be responsible for incontinence in older people. Such tumours, like diseases of the nerve trunks themselves, more often produce general incontinence, but nocturnal enuresis sometimes occurs in those who suffer from multiple neuritis, and the pressure from a tumour may influence the bladder in such a way that, while it can be voluntarily controlled with an effort, it is but poorly controlled in the unconsciousness of sleep.

Lesions involving the Spinal Nerve Centres and Tracts.—These lesions are far more frequently associated with general incontinence, and it is not proposed, therefore, to detail them here. They must not, however, be overlooked in forming a diagnosis.

Lesions involving the Higher Nerve Centres in the Cortex Cerebri.—Nocturnal epilepsy is a common cause of nocturnal incontinence. Deep sleep, such as occurs in children suffering from post-nasal adenoids, or hypertrophied tonsils, may contribute to the same result. Hysteria and neurasthenic conditions, being common among women, account for the fact that in the comparatively uncommon instances of nocturnal enuresis in adult life, women are more frequently affected than men.

Bad dreams, especially those in which the patient dreams of the act of micturition, may be mentioned here; so also conditions, in which ptomaines may be assumed to be circulating through the cerebral tissues, and indeed any other febrile condition.

Chorea more frequently produces general incontinence. Local organic brain lesions, meningitis, tuberculous and syphilitic lesions, and hæmorrhages may be mentioned in the same sense.

Lastly, lunacy, especially that attributed to general paralysis of the insane and to syphilitic taints, should be mentioned under this heading.

It is convenient also to mention here those apparently idiopathic cases, generally connected with an inherited tendency, and for which no cause can be attributed; while it must be admitted that there are occasionally met with cases that are influenced by the mere force of habit, or by wilful neglect on the part of a badly trained child.

In Conclusion.—Nocturnal enuresis is commonly found in weak, excitable children. It occurs in every class of life. It is, perhaps, more common in boys than in girls, but among adults, women are more frequently affected. It is frequently associated with some local irritative process, such as thread worms in the rectum, and it is more apt to occur in those who are in the habit of lying on the back during sleep. Moreover, it is sometimes a symptom of organic disease of a serious nature.

The Treatment of Nocturnal Enuresis.—Any course of treatment, if it is to be practical and successful, must aim at removing any condition, or group of conditions, that may be found in each individual case to contribute to the malady. Nocturnal enuresis is not, *per se*, a disease, but a symptom. The physician must, therefore, first diagnose the cause, and advise in accordance with his diagnosis.

Any sources of general debility must be, if possible, checked, and every means taken to strengthen the patient. Exercise in the open air may be recommended, and change of air is often very beneficial. Bathing in cool water, and, in obstinate cases, general massage may be advisable, and suitable tonics should be administered.

Any source of irritation, such as thread worms, must of course be removed.

The urine should always be tested, and, if found to contain any irritating combinations, the proper alteratives should be exhibited.

The meals should be properly regulated, and, in all cases, special regard should be paid to the evening meal. This should consist of easily digestible food, and tea and coffee, on account of their diuretic action, should be avoided. As a rule, a strong animal diet is objectionable, and all measures should be undertaken to overcome flatulence when necessary.

Careful inquiries should be made with a view to ascertaining whether nocturnal fits have been overlooked by the nurse, or parents, and, if so, bromides should be at once administered. The hysterical and mentally weak should be brought under suitable disciplinary influence, but, except in the very rare cases of wilful habit, scolding, or punishing, children is obviously to be strongly deprecated.

Lastly, tumours in the pelvis and organic diseases of the central nervous system must not be overlooked.

Passing now to the treatment of the symptom of nocturnal enuresis itself, we should encourage the child to use all his efforts of will to overcome his trouble. He should, of course, pass his water the last thing before getting into bed. It is a good plan to accustom the patient to emptying his bowels in the evening instead of in the morning. By this means the evil effects of a full rectum are disposed of, pelvic congestion

is relieved, and the gradually expanding bladder meets with a minimum amount of resistance during sleep. This simple precaution alone, has, in the writer's experience, sometimes cured the habit. The tendency to lie on the back during sleep may be overcome by attaching a bobbin, or other hard body, to the patient, in such a position that when, during his sleep, he lies in this attitude the pressure of the bobbin will disturb him, and cause him to turn over on his side. The child should be properly clothed at night, and not allowed to get too hot or too cold when asleep. The night-gown should be made of a comfortable and unirritating material. The bed clothing should not be too heavy, and a moderately hard mattress should be employed. If possible, the patient should be wakened at least once during the night to pass his water.

Of drugs employed, belladonna, or atropine and nux vomica, or strychnine meet with most favour. Though differing widely in their general effects, both may be credited with some influence, directly or indirectly, over the nervous control of the sphincters. Belladonna, which was first introduced for this purpose by Trousseau, probably acts by paresing the inhibitory nerve fibres of the sympathetic, and also by depressing the peripheral nerve endings of the sensory nerves. As, in medicinal quantities, its action is not very powerful, and as children bear the drug well, it may be, and should be, exhibited in large doses. The physician should begin, however, with moderate doses, say, 2 minims of the tincture for a child of five years, and should, if necessary, gradually increase the dose until the pupils are moderately dilated. It is advisable to use the B.P. preparation, which is standardised to contain 0·05 per cent. of the alkaloids. The physiological action of the drug may be maintained for a fortnight or more until the habit has been completely broken, after which the quantity may be gradually diminished. It is a good plan to adopt Baruch's method of administering two doses daily, one after tea and the other the last thing before going to bed. In this way, the maximum action of the drug may be obtained at the desired period.

If atropine is employed, it should be injected subcutaneously in doses varying with the age of child, and with the amount of tolerance shown to the drug, an hour before

bedtime. For a child of five years, the physician may begin with 1-minim doses of a 1-per-cent. solution.

Nux vomica and its alkaloid strychnine act by stimulating the motor nerve roots in the spinal cord, and are also useful by reason of their general tonic effects. If given in too large doses, these drugs, being somewhat accumulative, do more harm than good, by virtue of their tendency to set up intermittent contractions in the muscular wall of the bladder. The object is to exhibit just such quantities as may be reasonably expected to maintain the tone of the sphincter muscle, and to strengthen the patient generally. For a child of five years, 1½-minim doses of the B.P. tincture of nux vomica may be employed, and should be given three times daily after meals, for several weeks. The physician may conveniently combine nux vomica with belladonna, without fear of minimising the influence of either drug over the complaint, as in the following prescription :—

Tincturæ Belladonnæ -	- ♏ xxxii.
Tincturæ Nucis Vomicæ -	- ♏ xxiv.
Syrupi Aurantii Floris -	- ʒ iiss.
Aq. - - -	- ad ʒ iv.

Misce. Sig. Cap. ʒ ii. t. d. s. for a child of five years.

Tincture of belladonna may be further provided in a separate bottle, and added to the dose in increasing quantities as the physician may direct.

It is not proposed to enter, in detail, into the efficacy of the many other drugs which find favour with some physicians. Urotropine is sometimes of use, when the urine is at fault, and the alkalies are invaluable for patients having highly acid urines. Rhus aromatica has sometimes given excellent results. Whitla states that he has used it with success, and recommends 10-minim doses of a 1 in 1 fluid extract for children of 8 years old. Bromide of potash, chloral hydrate, opium, codeine, morphia, cannabis indica, and other narcotics had better be avoided. Creosote and other tar preparations, many of the volatile oils, ergot, cantharides, eucalyptus, buchu, lupulin, and the nitrates find their advocates. Antipyrin sometimes succeeds when other drugs have failed. Sulphonal, trional, and paraldehyde are sometimes used with success,

while stramonium and hyoscyamus act in a manner similar to belladonna.

When drugs do not succeed, resort may be had to local methods of treatment. Cold douches applied to the perineum may be recommended, as being both harmless and efficacious ; they should be given the last thing at night. Counter-irritation in the form of fly-blisters, applied to the spinal column, has been tried, but usually without beneficial effect. Sometimes, indeed, it aggravates the condition, especially if applied to the lower part of the spine. Good results sometimes follow the passage of a sound into the urethra. This should be carried out daily for several days. In the female, relief may occasionally be obtained by twisting the urethra. Attempts have been made to alter the course of, or, as it were, transplant the urethra, but this difficult operation has not been attended with good results. Brilliant results, however, have sometimes followed cauterisation of the urethra, as was practised by Sir Henry Thompson. The operation is more often successful when the cauterisation is carried well back towards the neck of the bladder. In males, a catheter is passed down to the prostatic portion of the urethra, and a solution of silver nitrate (10 grains to the ounce) is injected through the catheter. In girls, the solid caustic may be introduced.

In cases of congenitally small bladder, Simm's method of introducing daily into the organ large quantities of warm water may be employed, and this may be continued until an appreciable improvement in the capacity for retaining the fluid is secured.

A favourite method of late years has been that of employing electricity, but its effects are usually only transient. The constant and faradic current have both been used. One pole is placed over the pubes, or on the lumbar spine, and the other in the perineum, or actually in the vagina, or urethra (Picard). The sitting should last for a few minutes, and should take place daily, or every other day. The current should be as strong as the patient can bear without inconvenience. Recently, the method of introducing the electric pole into the bladder itself (which is of course previously filled with fluid) has been adopted. It must be borne in mind, however, that nocturnal enuresis in children generally ceases spontaneously at the

period of puberty, and it is not, therefore, worth while to undertake heroic measures, nor advisable to introduce electric, or other, sounds into the genital orifices of children approaching this age. Cold douches to the perineum are probably just as efficacious, and may be generally employed with impunity. Lastly, local massage has been advocated, and the sphincter itself may be massaged, as practised by Sanger, by means of a probe introduced into the neck of the bladder; but here again the physician must keep in mind the danger of inadvertently initiating the habit of masturbation.

In adults, the condition of nocturnal enuresis often depends upon disease of a serious nature, such as tumours in the pelvis, or upon some incurable disease of the nervous system. In such cases little can be done beyond supplying an apparatus to catch the urine, and to prevent wetting of the bed.

Reviews of Books.

The Historical Relations of Medicine and Surgery to the end of the Sixteenth Century. An Address delivered at the St. Louis Congress. By T. Clifford Allbutt, M.A., M.D., Hon. M.D. (Dub.), Hon. LL.D. (Glasgow), Hon. D.Sc. (Oxon. and Vic.), F.R.C.P., F.R.S., F.L.S., F.S.A., &c., &c. London: Macmillan & Co., Ltd. Pp. 125. Price 2s. 6d. net.

This most interesting and instructive little book, written in Professor Allbutt's well-known graceful and lucid style, traces the early history of medicine and surgery, not only as sister, but also as allied sciences, and gives an account of the antagonism which subsequently arose between them. To quote his own words, "The chief lesson of the Hippocratic period for us is that, in practice, as in honour, medicine and surgery were then one"; and further, "As we pursue the history of medicine in later times we shall see the error, the blindness, and even the degradation of the physicians, who neglected and despised a great handicraft." While Professor Allbutt recognises that, to one may be given manual dexterity, to another sagacity of observation and inference, and does not forget that Medicine (*i.e.*, medicine and surgery) is so vast that for the narrowness of man's capacity it must be divided, at the same time he urges that the limits should be by personal choice on natural lines, not by the survival of mediæval rules, telling each physician and each surgeon that he shall not follow the bent and growth of his own faculties and the intimate tracks of nature, but that, whatever his capacities and occasions, thus far shall he go and no further. The interesting study of the historical relations of the twin sister sciences completely establishes Professor Allbutt's position, and we most heartily thank him for the very clear and instructive address with which he has favoured us.

The Prevention of Senility and a Sanitary Outlook. By Sir James Crichton-Browne, M.D., LL.D., F.R.S., Lord Chancellor's Visitor in Lunacy. London: Macmillan & Co., Ltd. Pp. 141. Price 2s. 6d. net.

This admirable little book is the reproduction of (1) An Inaugural Address delivered before the Preventive Medicine Section of the London Congress of the Royal Institute of Public Health, and (2) The Presidential Address at the London Conference of the Sanitary Inspectors' Association.

In the former, Sir James Crichton-Browne successfully refutes Professor Osler's position that, at the age of 60, compulsory retirement and silence should be imposed upon all sorts and conditions of men, and shows by numerous instances that, if such had been the law, the world to-day would not be in possession of some of the finest works in art, science, philosophy, music and literature. As a good working hypothesis, he maintains that the natural life of man is 100 years, and shows how, of late years, the development of preventive medicine has tended to bring the average duration of life within measurable distance of that term. Much of course depends upon the nature of the individual, and inferentially he supports the truth of the saying that "Those whom the gods love die young," that is, because they never grow old in thought. While old age may begin in the cradle, youth will still linger in decrepitude.

In the latter, Sir James Crichton-Browne regards the popular interest that is manifested in health questions, as one of the most hopeful signs of the times. Topics that, a few years ago, were thought suitable only for a medical society, are now fully discussed in the public press. This intelligent co-operation of all classes is necessary in the great work of sanitary reform. The discussion as to the utility of sanatoriums is a case in point, and he does not hesitate to regard the movement as one of great promise. He also discusses at length, and with strong approval, the advisability of erecting cheap dwellings, removed from the polluted atmosphere of large towns, for the artisan classes. To be fully appreciated, these addresses should be read and studied, and we are convinced that those who are at all interested in the questions discussed, will feel amply repaid for the perusal of them.

Diseases of the Blood in Nothnagel's Practice. By Ehrlich, von Noorden, Lazarus and Pinkus. English edition edited by Stengel. London: W. B. Saunders & Co.

This work may be regarded as constituting, on the whole, the most important treatise on the blood-diseases that has yet appeared. Each article is a classic, and will remain worthy of careful and attentive study for many years to come, whatever the advances of hæmatology may be in the meantime. We cannot but feel, however, that so excellent a book ought to be, and might easily have been made still better; and regret that fuller advantage was not taken of the opportunity afforded by the issue of the English edition to make the work more complete, and to bring it up to date. For example, the general article on clinical methods of the examination of the blood by Ehrlich (previously well known in England in Myers' translation), whilst it gives many of the methods employed in full detail, omits altogether to mention others of greater importance. Further, in a work in which the various processes of staining blood-films occupies ten pages, we might reasonably expect working details as to the methods of counting the corpuscles, the use of Haldane's, or Oliver's, hæmoglobinometer (neither of which is referred to), and Wright's methods of estimating coagularity and alkalinity. The omission of these practical points renders the work incomplete, so that a student, who is taking up the study of the blood, is obliged to purchase another book which deals with the subject from its practical side.

On the clinical side, however, the work is admirable, though even here we find the same neglect of English work. In pernicious anæmia, for example, we find Addison's work merely mentioned, and the entire credit for the recognition of the disease attributed to Biermer. The views of Hunter are accorded three lines, and, in the symptomatology of the disease, no mention whatever is made of "oral sepsis." We cannot help thinking that this is a great mistake, for there is no doubt that this condition is very frequent in the disease, although it may not have the ætiological importance that Hunter claims for it. With this exception, Lazarus' article on pernicious anæmia is admirable, and is undoubtedly the fullest and most accurate one extant.

These, with perhaps some others, are, however, but slight faults, and the work is of so much importance that it must form part of any medical library.

Diseases of the Kidneys and of the Spleen. Hæmorrhagic Diseases. By Dr. H. Senator and Dr. M. Litten. Edited, with Additions, by James B. Herrick, M.D., Professor of Medicine, Rush Medical College, University of Chicago. London: W. B. Saunders & Co. Pp. 815.

This book is one belonging to that excellent series of monographs, issued in the German language, under the editorship of Professor Nothnagel, and is an authorised translation from the German, with numerous additions by Dr. Herrick, published under the editorial supervision of Professor Alfred Stengel. The major portion of it contains a complete account of diseases of the kidney, written by Professor H. Senator. The diseases of the spleen and the hæmorrhagic diseases, such as scurvy, infantile scurvy, hæmophilia, and morbus maculosus werlhofii, or purpura, are dealt with by Professor Litten. The whole volume may be regarded as an excellent reference book for the diseases of which it treats, and a very useful feature of the work is the vast number of references to the special literature of the subjects considered. These are, for the most part, as might be expected, German, but many English, American, and French also receive attention. We can safely recommend the volume before us as a reference book in the widest sense of the term. There are a few excellent coloured plates in it, and the index, which is complete, covers some thirty pages.

An Introduction to Physiology. By L. A. Hodgkinson Lack, M.B., Ch.B. Pp. 216. Edinburgh and London: William Green and Sons. 8s. net.

This book may be looked upon as a note book by the use of which a student may readily recapitulate the subject, after having read a larger and more complete text-book on physiology. The writer states that the work before us is not intended to replace the standard text-books. It naturally fails to do so. We only wish it were more complete. No doubt the defects of the book were in the mind of the author, for it is interleaved with plain paper to enable the student to add notes. The book is divided into three parts, namely Histology, Physiology, and General Chemistry, to which is added a short appendix on the testing of unknown substances, on the separating of proteids, and on blood spectra.

The Physiology and Therapeutics of the Harrogate Waters, Baths, and Climate applied to the Treatment of Chronic Disease. By William Bain, M.D. Durh., M.R.C.P. Lond., and Wilfred Edgecombe, M.D., Lond., F.R.C.S. Eng. Pp. xii. + 300. London: Longmans, Green & Co. 7s. 6d. net.

The object of this work is to place before the members of the medical profession sufficient evidence to show that the therapeutics of the Harrogate waters and baths rests on as a secure a foundation as that of drug therapeutics.

In fulfilling this object, the authors deal very exhaustively with the peculiar features of the waters and the climate of the place. Of the 80 springs of different chemical constitution, we are informed that 16 are used internally, the remainder being devoted to bathing purposes. A chemical analysis, of more or less recent date, of each of the waters used internally is given, and in each case its pharmacology and therapeutics are stated, thus affording tolerably detailed information for the guidance of the profession. In reference to the waters used for bathing purposes, their nature and consti-

tuents are stated, and the physiological action and therapeutic uses of the baths described.

A very interesting section is devoted to a description of the climate and its effect upon various diseases. In a final section, we observe that a general outline of the treatment of different types of chronic disease is given, and, where possible, the reasons for the mode of treatment which is recommended, are suggested.

The book should be of considerable value to general practitioners, whose patients can afford to spend a little time in a health resort like Harrogate. It is clearly written, well printed, and has a very useful index.

Medicine and The Public. By S. Squire Sprigge, M.A., M.D. (Cantab.). Pp. 293. London: William Heinemann. 6s. net.

Although the greater part of this book was originally published as a series of chapters appealing especially to the Medical Profession, the main portion of it really appeals to the general public, and on that account deserves a very wide circulation. It is very clearly, very temperately, and very judicially written, and those portions which directly relate to the inner life of the Profession are deserving of a careful study. For instance, the advantages, disadvantages, and anomalies of the different permanent services, such as the Naval, Military, Colonial, Indian, Sanitary and Poor Law, are carefully set forth, and we feel sure that, if the inequalities and hardships peculiar to some of these were more fully appreciated by the general public and the Government, they would be speedily redressed. In the Sanitary service, to wit, we are constantly being reminded of the failure of local authorities to carry out certain necessary reforms recommended by the medical officers of health. If these officers enjoyed security of tenure all over the country, a radical and beneficial change would very soon be effected.

The relationship existing between the Profession and the general public is fully discussed, and the need for a more complete observance of medical etiquette and concord by the members of the Profession insisted on. This would result in improved relations with the public.

The question of medical education is very fully dealt with, and on this account we heartily commend Dr. Sprigge's book to those who desire to enter the ranks of the Profession. In fact, to them, it will prove of the utmost possible value.

The advantages of University training are dwelt upon, and the desirability of uniformity in the various curricula enforced. We are afraid that the multiplication of Universities is not an unmixed good, for there is a danger of their under-selling one another by lowering the standard of their requirements and examinations. We rely on the General Medical Council to guard this point. We cannot too strongly recommend Dr. Sprigge's book to both lay and professional readers.

Notes by the Way.

The New Parliament.

THE new Parliament contains eleven medical men, and of these scarcely half have now more than a nominal connection with the profession. But even assuming that they will all stand shoulder to shoulder in defending medical interests and helping the cause of medical science, what are they among so many? And in regard to vaccination, for instance, it may safely be predicted that they will not act together. Already the "anti-vacks" are exulting in the anticipation that with Mr. Burns and Mr. Runciman at the head of the Local Government Board, the medical department will be reduced to a still more subordinate position than it has hitherto occupied. The anti-vivisectionists too are jubilant because the new Lord Chancellor is one of the Vice-Presidents, while Mr. John Morley is an honorary member, of the National Anti-vivisection Society. Mr. Burns is also claimed by them as a sympathiser, and one of the itinerant lecturers, who go up and down denouncing experimentation on animals, recently stated that there are many members who have taken their seats in the new Parliament, who had occupied the chair at meetings which he had addressed. From a House largely constituted of representatives of what may be called the anti-medical bias, which is strong in the social strata whose votes had such an influence in the late election, it is vain to expect any legislation in the interest of a class, unless indeed it be that which usurps for itself the designation of Labour. We need not, therefore, look for any amendment of the Medical Acts in the lifetime of the present Government. We may indeed consider ourselves fortunate if nothing is done to curtail such privileges as we possess, and if no new obstacles are placed in the path of scientific progress.

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The International Medical Congress.

THERE has been a good deal of criticism of the arrangements for the forthcoming meeting of the International Medical Congress at Lisbon, and it is certain that for many years past there

has been a growing feeling of dissatisfaction with the way in which these gatherings are conducted. They tend more and more to become mere parochial affairs at which matters of merely local interest are discussed in a language not understanded of the representatives of the larger world outside. Hence the question has been asked whether it is worth while continuing an institution which no longer serves the purpose for which it was intended. Most of the great special branches of medicine—surgery, obstetrics and gynæcology, ophthalmology, dermatology, syphiligraphy, otology—now hold international congresses on their own account; the neurologists are contemplating the formation of one, and now the laryngologists have announced their intention of doing likewise. It is announced that an International Congress of Laryngology and Rhinology is to be held at Vienna, in 1908, to commemorate the first application of the laryngoscope to medical diagnosis and the treatment of disease made simultaneously and independently by Türck and Czermak in 1858. It is natural that the laryngologists of Vienna should wish to commemorate the pioneer work done by Türck and Czermak, and it is fitting that they should invite their fellow-workers throughout the world to take part in celebrating the jubilee of their speciality. That the commemoration should take the form of an international congress, however, is a circumstance of deeper significance than may at first sight be apparent to those who have not closely followed the recent developments of the congress question. The leading representatives of laryngology have hitherto steadfastly set their faces against the holding of special congresses as tending to cut their particular branch of medicine off from the parent stem. Out of sheer perversity, apparently, the organisers of successive International Medical Congresses have done their utmost to thwart this praiseworthy resolve. Now the long-suffering of the laryngologists is exhausted and they have determined to follow the example of the other specialities. It looks as if a movement had been started which may lead to the resolution of the International Medical Congress into its constituent elements. This, we think, would be a misfortune alike for general medicine and for its several branches, for the Congress is the outward and visible sign of the unity of aim and method which

holds together the ever-growing empire of medical science. The proposal that the interval between one meeting and another should in future be five instead of three years, which is to be brought forward at Lisbon, may, if adopted, save the Congress. But a radical change must be made in its organisation, and in particular continuity of policy must be secured by the provision of administrative machinery that shall be both permanent and international.

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L'Entente Cordiale Médicale.

To the initiative of Dr. K. Sillonville, of Aix-les-Bains, is due the establishment, between our French brethren and ourselves, of friendly relations cemented by the exchange of visits, which did so much to open the eyes of each to the good qualities of the other. For many years doctors who, like Johnson, had a mind to see what was being done in other countries, had almost ceased to include Paris among the shrines to be visited. On the other hand, the French scientific pilgrims who came to our shores were few and far between. How much of this aloofness was due to the dislike between the two nations which has been fomented by irresponsible journalists, how much to a belief on each side that the other country was a scientific Nazareth out of which no good could come, it would be unprofitable to inquire. The important thing is to maintain the better state of things which has been brought about by the energy, tact and good feeling of Dr. Sillonville. In furtherance of this object, he has founded a society which he calls L'Entente Cordiale Médicale (the short title of which is E.C.M.). Membership of this society will ensure a warm welcome, and every help in the way of professional sight-seeing and serious scientific work, to British doctors visiting France and to French doctors visiting this country. It is suggested by Dr. Janicot in the *Bulletin Médical*, that the scope of the operations of the E.C.M. might be usefully extended by arranging an exchange of medical students between practitioners of similar standing in each country. There is at present no subscription, but it is hinted that this idyllic state of things may not continue. The success of the new society would seem to be assured, for already some 200 members have enrolled themselves on this side of the Channel, and almost as many in France. Among

the former are most of the leading members of the profession in London. Sir William Broadbent is Honorary President, and Sir Dyce Duckworth, President of the Committee. The Secretary is Mr. L. A. Bidwell. In the list of members we note the names of Dr. Allchin, Mr. Butlin, Sir Lauder Brunton, Sir Thomas Barlow, Sir James Crichton-Browne, Sir William Church, Mr. Watson Cheyne, Dr. Ewart, Dr. Ferrier, Dr. Kingston Fowler, Mr. Godlee, Dr. Galabin, Sir William Gowers, Mr. Jonathan Hutchinson, Professor Halliburton, Sir Patrick Manson, Mr. Malcolm Morris, Dr. Hector Mackenzie, Dr. Mott, Mr. Edmund Owen, Dr. Pye-Smith, Sir Richard Douglas Powell, Dr. J. F. Payne, Mr. Mayo Robson, Sir Thomas Smith, Professor Starling, Mr. John Tweedy, and Dr. Augustus Waller. Manchester is represented by Dr. H. Ashby and Mr. G. A. Wright, and Edinburgh by Mr. Cathcart; Cambridge, Bristol, Portsmouth, Windsor, Leicester, and Cardiff are also represented. Among honorary members are Sir Archibald Geikie, Sir William Huggins, Lord Kelvin, and Sir William Ramsay. Of the Paris members 80 are professors or hospital physicians, surgeons, and obstetricians. Among them are MM. Brissaud, Brouardel, Budin, Bouchard, Chantemesse, Déjerine, A. Fournier, Hallopeau, Huchard, Lucas-Championnière, Landouzy, Letulle, Lejars, Lannelongue, Pozzi, Quénu, Raymond, Roux, Sabouraud, Souligoux, and Tuffier. It is clear that the E.C.M. has the support of the *élite* of the profession.

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Inconsiderate Therapeusis.

It is the inevitable tendency of the human mind, when it is always exercised on the same problems, to become automatic in its operations. Hence many doctors prescribe in a routine manner, which makes their practice approximate to that of the machine which supplies a remedy for every bodily ill in exchange for a penny in the slot. We have all heard of the hospital physician who ordered walking exercise to a postman. But the most inconsiderate form of prescribing consists in the ordering of abundant food and generous wine to people who find it hard enough to keep body and soul together. A choice example of this kind of thing was cited in the *Matin* not long ago by M. Brieux, the well-known French playwright.

He found in the *Bulletin de la Société médicale des Bureaux de Bienfaisance de Paris* a record of the following prescription given at a hospital to a hawker, clothed in filthy rags, who earned a few pence daily in the streets :—

1. Avoid fatigue, damp, and cold.

2. Clothe very warmly ; wear flannel next the skin.

3. Feed well : underdone meat, 7 to 14 ounces a day, to be taken in cold bouillon after it has been scraped and then pounded in a mortar, or as balls in powdered sugar.

Raw or very lightly-boiled eggs (four to six, and, if possible, eight to ten a day).

Sardines in oil (two daily), butter, watercress, cooked and raw. A large cup of cocoa with milk in the morning. Beer to be drunk at meals.

* * * * *

Expatriation of Poor Consumptives.

OTHER physicians order without compunction sea voyages to people who cannot afford either the time or the money for them, or wantonly send into exile sufferers to whose prospects it means hopeless ruin. We know a case in which a very distinguished physician thoughtlessly, and even somewhat heartlessly, insisted that a young struggling doctor should at once break up his home and abandon the practice he was beginning to get together, and begin life again at the Antipodes. He apparently could not bring his high scientific mind down to the consideration of so trifling a practical detail as ways and means, and he was angry because the patient preferred the possibility of an early death at home to the all but certainty of starvation abroad. This is less common now than it used to be some years ago before the Colonies objected to being used as a dumping ground for tubercle bacilli from the Mother Country. We have heard woful tales of the physical suffering and heart-break caused in this way to many wretched exiles in South Africa. Quite recently the Committee on the Prevention of Tuberculosis of the New York Charity Organization has deemed it necessary to send out a circular calling the attention of the medical profession to the consequences of sending poor consumptives to Arizona, Colorado, and California. It is urged that such patients are better off at home, where they

have relatives and friends to look after them, than in remote places where they are thrown on their own resources. It is pointed out that the stranger, who has spent a large part of his little savings in travelling to the place where he seeks for health, soon finds himself without work, ill-housed, ill-fed, and ill-tended. The practice of sending such patients to other climates thus defeats its aim. The Committee, therefore, invites the co-operation of the profession to prevent tuberculous patients being sent to other States, unless they are physically able to work, and have secured in advance a definite assurance that they will have the opportunity of doing work for which they are fitted at a wage sufficient for their suitable support; or unless they have at their disposal sufficient funds to provide for their proper maintenance, during a period long enough to enable them to reap the benefit, that may be looked for from the change of climate. We commend these considerations to the serious attention of all physicians who think they have discharged their duty to a consumptive by sending him to die under a bluer sky.

* * * * *

The Clothing of the Consumptive.

THE question wherewithal the consumptive should be clothed has been studied experimentally by Dr. Mangat. It is recognised that light has a favourable effect on sufferers from phthisis, and this is presumably due to the bactericidal action of the rays. From this Dr. Mangat infers that the clothing of consumptives should be of such a nature as to allow the light to penetrate with the least amount of interference, so that as little as possible may be lost of its therapeutic properties, tonic and bactericidal. For this purpose he has found that white stuffs are the best, as they allow the largest number of chemical rays to pass through them, and absorb none of the coloured rays. Therefore, he says, consumptives should wear raiment of white linen, velvet, cotton, or cloth; they should not, however, wear white silk. Next to white, garments of blue and violet are to be recommended. Garments of such hues do not, however, answer the purpose so well as white, because, instead of allowing all the rays of the spectrum to pass, they intercept all but those corresponding to their own tints. Blue or violet stuffs are, therefore, permeable only by

the chemical rays. Black, red, yellow, or green substances should be absolutely rejected, as they prevent the passage of any bactericidal rays. Ladies can easily arrange schemes of colour in clothing that will fulfil these conditions. But what is the male consumptive to do? In summer he can, of course, go about clad in white; but in winter is he to walk about the streets arrayed in blue and violet?

* * * * *

Competitions.

THE result of the January Competitions is as follows:—The best essay was sent in by Dr. C. G. Macdonald, of Bowes Park, N.; and the best answers to the questions by Dr. H. Stewart Brander, of Keighley, Yorkshire. Cheques have accordingly been sent to these gentlemen.

NOTES FROM FOREIGN JOURNALS.

THE INDIVIDUAL TREATMENT OF DIABETES

This subject is fully discussed by Stark in the *Medical Record* of 28 Sept. 1905. He considers that the old classification of the disease as slight, moderate, and serious, which is based upon the quantity of sugar in the urine, and its tendency to disappear under strict diet, is too arbitrary to be of any use in the treatment of individual cases, and that it no longer corresponds to our knowledge of the energy-value of foods. There are, moreover, cases of diabetes which are slight, although passing a large amount of sugar, and cases which are serious although showing very little sugar in the urine. He is of opinion that, in the treatment of each case, it is better not to take any notice of classification, but to direct one's efforts against the morbid phenomena showing themselves in each case. In this treatment it will be necessary to determine the following points:—Assimilative capacity for carbohydrates, general condition (anæmia, plethora, obesity, or wasting), mental condition of the patient, capability for keeping up his weight, state of the assimilative digestive functions, nutritive equilibrium (obtained by the comparison between the specific gravity (density) of the urine and the total amount of urea excreted on the one part and the proteid food ingested on the other), age, mode of life, presence of complications (nephritis, myocarditis, arterio-sclerosis), natural preferences for foods and beverages.

The treatment may be divided into prophylactic, symptomatic, and dietetic. In prophylaxis, account must be taken of heredity and of the influence of race; oxaluria is often a premonitory symptom of glycosuria. Cases showing such predispositions must be treated dietectically and hygienically.

Symptomatic treatment aims at dealing with certain symptoms, at first hunger and thirst. The patient must not "eat his fill," and should drink in small quantities, taking small doses of codeine when necessary. For wasting and loss of strength, it is well to order fats, cod-liver oil, butter, yelks of eggs, edible oils, and bone-marrow. Taken without excess, fatty matters do not in any way promote acetonuria. There is no specific treatment for glycosuria and polyuria. Opium can be tried, but never in large doses, and, if no effect is obtained, it is much better to give it up altogether.

The treatment of diabetes is especially dietetic. For guidance, the presence of acetone and the quantity of urea must be ascertained, and then the tolerance of the patient for carbohydrates. For example, a quarter of a pound of bread (equal to over two ounces of sugar) should be given, and two days afterwards the quantity of sugar excreted must be determined; the difference between the quantity ingested and the quantity excreted will show the amount of tolerance for carbohydrates. In this way is shown the existence of two classes of cases, one of which exhibits a tolerance more or less marked for starchy food, while the other cannot assimilate this

food at all. Cases in the first class are usually in good general condition, and may be allowed a certain quantity of starchy food, some wine, potatoes, and green vegetables. Gluten-bread is acknowledged to offer too many inconveniences. As a rule, if not contraindicated by the state of the urine, Stark prescribes a strict diet without sugar for ten days, and then gradually returns to carbohydrates, until the limit of assimilation is reached. The second class of cases, which includes those which have glycosuria even with a diet free from carbohydrates, must not be submitted to too severe a *régime*. If the patient is up in years, alcohol should be allowed as a stimulant to overcome the feeling of weakness. Symptoms of coma must be closely watched for, and little more can be done than to keep the digestive functions and assimilation in as good condition as possible.

The same subject is dealt with by Friedenwald and Ruhrah in the *American Journ. of Med. Sciences* (Oct. 1905). They have seldom found the milk treatment indicated in their cases, except when the urine contains di-acetic acid and the patient was threatened with an attack of coma. On the other hand, they have in many of their cases ordered half a litre to a litre of milk a day, in addition to the other foods allowed, and frequently with excellent results. As this diet can be actually harmful, it is always important to watch the effects very closely.

As regards the potato cure, they have never, like Mossi, replaced all the carbohydrates by potatoes, but have only substituted them for a certain quantity of bread. A patient, who can eat a quarter of a pound of bread, can take three-quarters of a pound of potatoes, so that part of the bread can be replaced. In settling the proportions, there has never been produced the least trouble, even in the serious forms of diabetes. In a large number of cases, potatoes have been a most useful addition to the diet; the more so as there are many ways of preparing them, and butter in large quantities can be associated with them.

The results obtained by these writers with oatmeal have been most satisfactory; but, according to them, it should never be allowed to slight cases, as it is only in serious cases that it yields good results. The effect of each different diet, or food, must be carefully watched in each individual case.

In the *Therapeutic Gazette* (December, 1905) Professor Tyson publishes some interesting remarks on a few facts which are of importance in determining a proper management. He emphasises the necessity for accurate determination of the percentage of sugar eliminated in 24 hours, not merely from time to time, but frequently. It is of first importance to ascertain what capacity remains to a patient for assimilating sugar and starch. In his experience he has found it an encouraging fact that so long as the quantity of glucose in the patient's urine does not exceed 2 per cent. he is in no danger. When patients are on a fairly liberal diet, he is in the habit of cutting down the diet to as complete abstinence from carbohydrates as possible for from forty-eight to seventy-two hours about once a month, so that the glucose may be reduced to a minimum. He considers Von Noorden's three-weeks' course of abstinence too long. The only drugs he has found of any benefit are opium, which he prefers to codeine, and small doses of Fowler's solution. Alkalies are useful as a protection against the serious complication of acid intoxications, and he likes to keep

a patient more or less constantly under the use of alkalies, either as citrates, or carbonates, of potash, or the natural alkaline mineral waters. In diabetic coma the urine must be alkalised as thoroughly and as quickly as possible.

RENAL THERAPEUTICS.

Prof. A. R. Edwards delivered the address in medicine before the Mississippi Valley Medical Association in October last on "Certain Phases of Uræmia," which is reproduced in the *Therapeutic Gazette* of November. As regards treatment, he considers that this cannot be systematic since the actual mechanism of uræmia is imperfectly known. He suggests that it is an auto-intoxication with a mechanical element (circulatory changes, or increased intracranial pressure). He deals with the subject generally, with particular reference to one complication, uræmia.

1. *Prevention.*—Can only have a limited application, being usually too late (*e.g.*, excessive eating, intemperance, overwork, neglect of infection, &c.).

2. *Rest and Exercise.*—Bright recognised the importance of rest in bed for relief of the kidneys. Rest must be absolute so long as the heart is weak, the urine scanty, and œdema considerable. Even in moderate cases, and in intervals of improvement, relative restriction must still be enforced. Rest lessens the amount of waste products to be eliminated by the kidneys and by protecting the skin, the vessels dilate, increasing the functions of the skin, and relieving thereby the vascular tension in the kidneys. Fatigue, damp, and cold must be avoided. The need for psychical rest is strongly insisted on, since great benefit is afforded by relief of nervous tension. Exercise, in general, should supplant work, but should not be taken after, or in addition to, hard nervous strain.

3. *Springs and Climate.*—Only those free from œdema and serious heart trouble should be sent to watering-places (Vichy and the like). Material benefit arises from wintering in a warm dry climate.

4. *Diet.*—This should maintain nutrition without taxing the eliminative capacity of the kidney, or burdening the circulation. Vicarious excretion of water by the lungs, skin, and bowels will compensate for disease of the glomeruli only, but no other structure can compensate for disease of the tubules, through which must go the final products of albuminoid metabolism. Albuminous foods should, therefore, be replaced by fats and carbohydrates. The small amount of albumin lost through the kidneys can easily be replaced by a glass or two of milk daily.

Restriction of albuminous food lessens the irritation of the excretory cells, but no absolute rule can be laid down for all cases. The severity of a nephritis cannot be gauged by the degree of albuminuria, nor improvement estimated by the influence of diet in the albuminuria alone. Nutrition must be maintained, especially in parenchymatous nephritis, hence, in restricting a diet, regard must be paid, above all, to this factor, as well as to lessening renal irritation. Cream, butter, olive and cod-liver oils, and other fats are very important. Anæmia and disturbed nutrition are marked features in the parenchymatous type in contrast to the interstitial. The individual must be considered much more than the disease itself, or its type.

Milk diet is free of extractives, easy of digestion, and acts as a diuretic, but it is bulky, lacks iron, contains too much water and too much proteid in

the quantity necessary to maintain nutrition, viz., four quarts. The blood gets overloaded and strains the heart, while the kidneys are irritated by the phosphates and chlorides. The needs of metabolism will be met by two to three pints of milk with a pint of cream, fats, and carbohydrates. Nearly half the phosphates can be precipitated in the intestine, and kept away from the blood and kidneys, by giving five to ten grains of calcium carbonate with the milk, as von Noorden has suggested. Milk must be taken slowly in sips, as a food, not as a drink.

Meat is now given more liberally; the daily amount allowed by von Noorden is about three ounces. As regards extractives, purin bodies, &c., there is no difference between red and white meats. Some meat is better than an over-bulk of vegetables, except in uræmia, when all nitrogenous matter must be kept down, including milk and leguminous vegetables.

The chlorides must be avoided in parenchymatous nephritis with œdema.

Cheese, relishes, horseradish, onions, asparagus, broths, beef-tea, and alcohol are irritants which must be absolutely avoided. Tea and coffee must be taken in strict moderation.

5. *Water.*—Flooding the vascular system with water overtaxes and eventually damages the heart. Excretion of water by the kidneys means increased blood pressure. Many weak hearts give a history of excessive water-drinking, and improve, if the amount is limited to about $2\frac{1}{2}$ pints a day.

6. *Symptomatic Therapeutic Measures.*—Diuretics are generally futile, and best avoided. Cream of tartar and citrate of potash are safe, they are supposed to abstract water from the tissues, and convert urea, uric acid, &c., into more readily excreted substances; they are most active in effervescent form.

7. *Œdema.*—This is always a source of danger in several directions. Cathartics may remove fluids as well as solids. Drastics require care on account of digestion and nutrition.

Sweating, if excessive, may concentrate the blood and predispose to uræmia. It is not much in favour at the present time. Edwards prefers the old-fashioned warm bath, with an ice-bag on the head to prevent cerebral congestion. After twenty to thirty minutes in a bath, raised to five or six degrees above body heat, the patient is wrapped in blankets without drying.

Pilocarpine is unsafe on account of many drawbacks.

Edwards prefers incisions to all other measures for relief of œdema. The fluid escapes directly without having to be reabsorbed into the blood with all its toxic elements, thereby throwing an additional burden on kidneys already unequal to their task. He makes deep three-inch long incisions over the legs.

8. *The Circulation.*—Treatment often resolves itself into care and stimulation of the heart. All strains, mental and physical, must be avoided. The more hypertrophy the better and longer outlook.

With cardiac overaction, as observed early in uræmia, the high tension may be corrected by vaso-dilators. When extreme tension and imminent uræmia exist, tincture of veratrum viride, mins. v—x every half hour for 3 or 4 doses, may be given, or large doses of nitro-glycerine, gr. $\frac{1}{50}$th to $\frac{1}{20}$th, until a result is obtained. Bleeding may relieve intracranial blood-pressure, but too

often fails. Lumbar puncture is more effectual, giving general and lasting relief of urgent symptoms. The normal tension of 120 m.m. (water) is often increased to 500 or 600 m.m.

When the heart is weak, and has become rapid, irregular, or galloping, stimulation by digitalis and strychnine is indicated. Palpitation, dypsnœa, and cardiac unrest are treated by morphia (hypodermically), ice to the præcordia, champagne, nitroglycerine, bromides, and valerian. Venesection relieves the labouring heart by lessening the concentration of the blood, normal saline infusions act in the same way.

9. *Vomiting* and diarrhœa should not be checked if vicarious. Lavage of stomach and of colon are reasonable procedures.

10. *Convulsions* require morphia by hypodermic injection. Edwards has never seen harm result. Chloral, 15 grains every hour for not more than four doses, helps the morphia ; bromides are too slow.

11. *Surgical Treatment* is still *sub judice.*

Finally, "we must remember that the practical physician attains the best results by individualising, not by schematising."

PREVENTIVE TREATMENT OF SYPHILIS.

The experiments of Metchnikoff and Roux, published in the *Annales de l'Institut Pasteur* (No. 11, 1905), were devoted to the inoculation of syphilitic virus into apes, and open up a prospect of great practical interest. If the points of inoculation were subjected to friction with a mercurial ointment one hour after inoculation, the animal escaped infection. The experiments were repeated several times, and always with confirmatory results. A chimpanzee was inoculated in each eyelid with syphilitic virus of human origin. Three-quarters of an hour later the inoculated points were rubbed for ten minutes with mercury ointment. Some local inflammatory trouble resulted, which lasted a few days, ending in formation of a scab, but no specific symptoms developed. Another ape, which had been inoculated with the same virus at the same time and left untreated, developed typical chancres after 28 days' incubation. The first ape was next inoculated with virus from a fresh source, and after an interval of 30 days presented a typical chancre at the site of infection, and a month later had a characteristic mucous patch on the upper lip. A macacus, which had been inoculated with the same virus at the same time, and treated with mercurial inunction one hour afterwards, escaped infection.

Finding that the use of mercury ointment gave rise to local irritation and inflammatory action, other mercurial preparations were tried, of which calomel proved to be the best, used in an ointment composed of ten parts of calomel and twenty of lanoline. A chimpanzee and a macacus were inoculated. After an interval of one hour and three-quarters, the calomel ointment was rubbed in the places for five minutes. Neither of the animals presented any lesion due to the ointment, or to the virus. Two cynocephali were inoculated, one of which was treated with calomel ointment afterwards. The untreated animal developed syphilis after an interval of 40 days, while the other was free at the end of two months, when it was again inoculated, and developed typical lesions in 28 days. Other experiments yielded similar results.

The question arises as to what extent these prophylactic measures are applicable to human syphilis. The calomel ointment is active, and produces no local irritation. It is suggested that its use should be recommended to those who have been exposed to contagion, rubbing it for some minutes into the suspected point of infection. The difficulty in most cases is to know the actual spot, and if it will be affected by the ointment. Fournier is sceptical on the point, but it seems worth while to try.

TREATMENT OF CHILBLAINS.

Surgeon-Major Camus points out in the *Archives de Médecine Militaire* that formol is not only useful for the treatment of plantar hyperhydrosis, but will also cure chilblains. He uses the commercial solution of formic aldehyde known as formol, painting it over the surface of the chilblain. It causes some irritation, shown by redness and exacerbation of variable length and intensity. This temporary irritation, by setting up local hyperæmia and increasing the vitality of the tissues, represents a reaction favourable to cure. Besides this, the application brings about the production of a horny epidermal layer which takes some time to disappear. Formol is known to be a keratinising agent of the first order. It, therefore, acts in two ways, irritative and protective.

The technique of the treatment of chilblain in the erythematous stage is extremely simple. For two or three consecutive days the part affected is painted over with formol, pure or half strength, once or twice a day, or even more often, according to the stage at which treatment is begun and the degree of the affection. The first effect noticed is the disappearance of the pain and discomfort. The tension and redness lessen quickly, and, after a few days, the affection may be looked upon as cured. As a general rule, chilblains are only presented for treatment at a somewhat late stage, when vesicles, or even ulcerations, have appeared. Formol may be painted over vesicles without fear, but it must not touch ulcerations. In the case of vesicles ulceration will follow, but the ulcer is clean and healthy in appearance, and skins over quickly. Such parts of the skin that are not very supple will end under the treatment by cracking, but this can easily be remedied by the use of ointments in which glycerine, lard, or vaseline is the main constituent. Formol does not prevent relapses, but nothing is easier than a new series of applications. It may, however, be used as a prophylactic.

Camus commends the treatment for its ease of application and its successful results, and considers it to be one of the best measures for adoption for the treatment of this particularly rebellious affection.

NORMAL SALT SOLUTION IN URINARY SURGERY.

Some remarks are published by Pasteau in *Le Nord Médical* (15 Dec. 1905) on the good effects obtained by the use of saline solution in urinary surgery. Whether it is a question of the surgery of the urethra, of the bladder, or of the kidneys, irrigations often play the chief part in the treatment, as their object is to free the mucous surface from the products of cell-disintegration which cover it, as well as to act directly upon it, in order to bring about a more or less complete disinfection. To the mechanical action of cleansing, irrigations are able to add a modifying and antiseptic action, which is useful in many ways, as by destruction of superficial parts of the

infected mucous membrane, by acting upon the infectious matters themselves, or by promoting reparative processes in the affected surface. In choosing a solution, suitable for all these purposes, it is necessary to bear in mind certain precepts of physiology which have been too often forgotten in this connection. Many irrigations are badly borne because the fluid is too cold, too hot, or too active, under too great pressure, or in too large quantity. For an irrigating solution to be well borne, it is necessary that it must not be irritating to the tissues, and also that it must be capable of dissolving or carrying away clots, purulent débris, and the various deposits which are soiling the mucous surface. Antiseptics in very weak solutions are, perhaps, useful, but when large quantities of fluid are used, they become irritants. Plain water has the like disadvantage.

Pasteau for some years past has made use of normal salt-solution (7·5 parts per 1000), which he considers has every advantage and no drawbacks. It is not an irritant; it has no destructive effect upon the mucous membrane, like boiled water and antiseptics (even when freely diluted); it dissolves blood-clots very well, and easily breaks up purulent débris, thus allowing their readier removal. If any of the irrigating solution remains behind, the increased absorptive power of the inflamed mucous membrane is only introducing into the system a liquid whose action on the general condition is quite beneficial. Finally, the ease, with which solutions can be made at all times and in all places, recommends the use of salt solution to the practitioner. When boiled for about half an hour, and used shortly after its preparation, it is sufficiently sterilised for all purposes.

TREATMENT OF DIPHTHERITIC LARYNGEAL STENOSIS.

Hecht recommends (*Therap. Monatshefte*, December, 1905) opiates in certain cases. If the pulse is full, and there is no trace of myocarditis, these will bring about in twenty-four hours the disappearance of the stenosis, and all intervention can be avoided. Another condition consists in the absence of false membranes, according to the author cases of this kind are most numerous, and the stenosis is due to an acute inflammatory œdema. In default of opiates and of injections of antitoxin, a spray with cocaine-adrenalin can be used, according to the following formula:—

℞ Cocain. Hydrochlorat. - - - - gr. iss—iij.
Solut. Adrenalin-Hydrochlor. (1°/₀₀) - m. xxxx.
Antipyrin. - - - - - - ʒj.
Aq. Menth. Pip. - - - - } āā. ʒj.
Glycerini - - - - - - }
Aq. destill. - - - - - ad ʒvj. M.

To be used three or four times a day.

Practical Notes.

Treatment of Chronic Constipation of Children. —Chronic constipation is not infrequently found to occur in quite young children, and its usual cause is either atonicity of the large bowel, or some error in diet, such as too little fat in the food. Occasionally, however, it is due to the lack of the proper intestinal secretions. The fæces are, as a rule, paler than normal, or sometimes even grey and offensive, like those which are present in cases where bile is absent from the intestine. If the child is still being breast fed, Jacobi recommends that before each nursing, a teaspoonful of loaf-sugar dissolved in tepid water, or oatmeal water, should be given to the baby, this he has found to be most efficacious. Drs. Goodhart and Still recommend the following treatment: —

℞ Mannæ - - - - - ʒii.
Syrupi - - - - - - ℥j.
Aq. Carui - - - - - ad. ℥ij.
Ft. Mist.
A teaspoonful to be administered three times daily; or

℞ Magnesii Sulphatis - - - - ʒj.
Syrupi Zingiberi - - - - ℥ss.
Aq. Anethi - - - - - ad. ʒiij.
Ft. Mist.
A teaspoonful to be administered three times daily.

The peristaltic movements of the lower bowel may be excited by the small soap suppository, or by an enema. At the same time, every morning and evening the abdomen may be gently rubbed, preferably with an oiled hand. Perhaps the best enema for a young child is one consisting of three ounces of warm water with a little yellow soap added, in order to make a lather. This should be carefully injected into the bowel, a drachm of castor-oil may be added to the enema, if necessary. It is important to inject just as little of the fluid as is absolutely necessary, for, if too much is used, the colon may become distended, and this condition will naturally increase the tendency to constipation. As an alternative, a drachm or two of glycerine may be gently injected into the

bowel. If the constipation occurs in children from three or four years of age, and is associated with pain in the abdomen and much flatulence, Dr. Eustace Smith recommends the following combination of drugs:—

℞ Sod. Bicarbonatis - - - - ʒj.
Tr. Nucis Vomicæ - - - - ♏ iii.
Tr. Cardamomi Co. - - - - ʒij.
Syrupi - - - - - - ʒij.
Aq. Chloroformi - - - - ʒss.
Aq. - - - - - - ad ʒij.
Ft. Mist.

A teaspoonful to be administered every six hours.

Drs. Ashby and Wright have found liq. euonymin and pepsine, in fifteen to twenty minim doses, very useful in the constipation of infants and young children.

Constipation occurring in girls and boys, as a rule, calls for a careful local examination, since it is sometimes associated with a fissure in ano, a stricture of the intestine, or perhaps a hernia. Should the constipation be associated with sickness, especially if the latter persists, the patient should be very carefully examined for some evidence of peritonitis, intussusception, or even for some cerebral disease. In cases of simple uncomplicated constipation, regular habits must be enforced, and the child urged to go to stool about the same hour daily. This is, of course, a part of every mother's duty. The child's diet should be regulated, a certain quantity of oatmeal, fruit, and green vegetables should be given daily, and suitable daily exercise in the open air must be insisted upon. If these simple measures fail, drugs must be resorted to, but, with the distinct understanding that, when once the bowels have begun to act properly, they must be discontinued. A half to one teaspoonful of the confection of sulphur may be given every night for three or four nights successively. The following mixture will also be found useful:—

℞ Sodii Sulphatis - - - - gr. xx.
Magnesii Sulphatis - - - - gr. xx.
Tr. Nucis Vomicæ - - - - ♏ iii.
Tr. Belladonnæ - - - - - ♏ v.
Glycerini - - - - - ʒi.
Aq. - - - - - - ad ʒss.
Ft. Mist.

This may be given twice daily after food until the bowels act regularly, or the following may be prescribed :—

℞ Magnesii Sulphatis - - - - ʒij.
Vini Ipecacuanhæ - - - - ʒj.
Syrupi Aurantii - - - - ʒj.
Aq. - - - - - - ad ʒiij.
Ft. Mist.

Two teaspoonfuls to be given two or three times daily.

In some cases, the constipation of young girls is associated with anæmia, for these the following mixture will be found very efficacious, although it is perhaps somewhat unpleasant :—

℞ Magnesii Sulphatis - - - - ʒss.
Ferri Sulphatis - - - - gr. ss.
Acidi Sulph. aromat. - - - ♏ j.
Aq. Chloroformi - - - - - ad ʒss.
Ft. Mist.

One tablespoonful to be given two or three times daily before meals.

Should an anal fissure be discovered to be the cause of the constipation, the bowels must be kept quite free, so that there may be less tendency for the fissure to be further torn, and an ointment consisting of equal parts of Unguentum Plumbi, Unguentum Hydrargyri, and Unguentum Zinci should be applied to the fissure. In cases which resist this treatment, the sphincter may have to be forcibly stretched while the patient is under a general anæsthetic.

METABOLISM.—*The Metabolism of the Fats.*—During digestion, fat is split into glycerine and fatty acid, while some of the fatty acid combines with the alkaline salts present in the alimentary canal to form a soluble soap. During absorption, the soluble soap is resolved into the alkali and fatty acid, the latter of which combines with the absorbed glycerine to form once more fat. This fat is taken by some of the cells in the lymphoid tissue in the villi, into the central lacteals, from whence it passes into the lacteal stream, thence into the thoracic duct, and finally into the venous stream in the neck. It is supplied to the tissues by the blood stream,

by means of which it is stored in various regions as fat. There is no doubt that fat can also be formed from carbohydrate food, and farmers and others are fully alive to the value of carbohydrates as fattening food. It is, however, quite an open question as to whether pure proteid aids in the formation of fat in the body, although it is tolerably certain that, in a case of *phosphorus poisoning*, the fat, which is found in the liver cells, in the cardiac and skeletal muscles of the body, and in the kidney epithelium, is derived from the tissue proteids. In this case, it is believed that the poison causes a splitting up of the proteid molecules of the tissues into a carbonaceous moiety, which remains in the tissues as fat, and into a nitrogenous moiety, which is excreted as urea and uric acid. When oxidation takes place in the tissues, some of the fat deposited there is converted into carbon dioxide and water. We may, therefore, look upon carbohydrates and fats in our tissues as the chief sources of animal heat and muscular energy.

The Metabolism of the Proteids.—The end products of the digestion of proteids in the alimentary canal are either peptones, or amino-compounds; these are absorbed. If peptones are absorbed by the villi of the small intestine, they are reconverted into the serum albumen and serum globulin, which are to be found as the most important proteids in the blood. The amino-compounds too, if they are absorbed as such, are reconverted into serum albumen and serum globulin by the columnar cells lining the surface of the villi. The blood containing these soluble proteids bathes the tissues. It is well known that the animal cell requires, above all things, proteid food, and, when it can get sufficient of this material from the blood stream, it uses up practically nothing else. Only when proteid is lacking, will the cells of the body make use of carbohydrate and fat for its anabolism, or constructive metabolism. The sole seat of oxidation processes is the living cell, that is, oxidation takes place alone in the tissues, and it is this proteid, which at one time formed an integral part of the living tissues, which is ultimately converted by oxidation into urea. The urea, which is formed in the body by a process of oxidation, may be looked upon as representing the "wear and tear" of the tissues. If, however, a man was starved, and

yet did some work, the source of heat and energy for such would be derived from the oxidation, in the first place, of the carbohydrate of the tissues, and, in the second, from that of the fat. When, however, all the carbohydrate and fat are used up, heat and energy may still be derived from the oxidation of the proteid in the tissues themselves. This would mean an increased output of urea and uric acid, and the man would rapidly lose flesh. A series of experiments in connection with this question has been carried out, which show that the extent of proteid metabolism depends upon the nutritive condition of the tissue cells and the body, and not, as was at one time supposed, upon the condition of the proteids, serum albumen and serum globulin, contained in the circulating tissue juices. In the "Banting cure" for obesity, a patient is allowed to eat a large quantity of lean meat, the carbohydrates and fats are either markedly restricted, or not allowed at all. If plenty of exercise is taken during the period of treatment, the heat and energy are derived from the oxidation of the tissue carbohydrates and fats; these will, therefore, be used up, and, as there is little or none to be obtained from the food, the individual loses "*flesh*" rapidly. When all the carbohydrates and fats of the body have been oxidised, then the body proteids of the cells and tissues are disintegrated, and there is a further "*loss of flesh*" and weight, with an increase in the output of urea and uric acid.

It has already been stated that the urea output by the kidneys is the chief index of the amount of "wear and tear" occurring in the proteid tissues in the body as the result of nitrogenous katabolism, but the amount of uric acid excreted also indicates, to a certain extent, the amount of nitrogenous katabolism occurring in the nucleoproteids of the tissue cells. Nucleoproteid, as it occurs in the cells of the body—the leucocytes, for example—may by artificial gastric digestion be resolved into two simpler bodies, proteid and nuclein, of which the latter may be further resolved into a simple proteid and nucleic acid. Nucleic acid further disintegrates to form, amongst other substances, phosphoric acid and bodies known as the *xanthine*, *alloxuric*, or *purine bases*. Purine itself has the formula $C_5H_4N_4$, which on oxidation yields $C_5H_4N_4O$, which is monoxypurine or hypoxanthine. On further oxidation

$C_5H_4N_4O_2$, dioxypurine or xanthine, is produced, and the final product is $C_5H_4N_4O_3$, trioxypurine or uric acid. Splenic extract contains, amongst other compounds, hypoxanthine, xanthine, and traces of uric acid. It is surmised, therefore, that the spleen is the region in which some of the uric acid is produced in the body, and that mainly from the nucleoproteid of the leucocytes. The same change may also take place in the liver, and possibly in other tissues. There are two principal conditions which give rise to an increase in the output of uric acid in the urine, and which are :—1. An increase of white corpuscles in the blood ; this fact is very important when it is remembered that leucocytes contain large quantities of nuclein. In the disease leucocythæmia, there is a large increase of white corpuscles in the blood because of increased formation, there is consequently an increased destruction going on, the result of which is an increased formation of uric acid in the body, and therefore an increased output. 2. An increased diet of meat, proteid and nucleoproteid, with diminished oxidation processes, as occur in people of sedentary habits.

From the above statements, it will be seen that in man, at any rate, uric acid arises by oxidation from the purine bases, which are derived from the cells which have disintegrated. And the cells, which have been broken down, may be those in the body, this the result of nitrogenous katabolism, and this uric acid may be called the *endogenous*. That which is derived directly from the cells of the food, which has not been assimilated, that is which has *not* been actually built into the body, is called the *exogenous* uric acid. It will, therefore, be seen that the rational method of treating gout, which means increased formation of uric acid in the body, is, in the first place, to carefully regulate the diet in order to put into the body as little nucleoproteid as possible, and, in the second, to control nucleoproteid, or cell destruction, as it occurs in metabolism, so far as possible.

THE CASE FOR COMMENTARY IN THE JANUARY NUMBER :—The patient under discussion had been, and was still suffering from *gall stones* (cholelithiasis). The sex, age, well-nourished condition, and previous two years' history all support

this diagnosis. The abdominal pain coming on after food, and relieved by vomiting, was due to the fact that small gall stones came down the cystic and common bile ducts with the bile, and were, no doubt, mainly expelled by the contraction of the abdominal muscles. The recent severe attacks were due to larger gall stones, while the sudden ending of one was the consequence of sudden expulsion. The gradual subsidence of the other was probably due to the slower passage, and a catarrhal inflammation set up by the stone. The tender lump in the right hypochondrium was a distended and inflamed gall bladder, in all probability due to some infective cholecystitis, and the icteric tint arose from some obstruction occurring in the ductus communis choledochus, due to catarrhal cholangitis which was set up by the injective process. At no time was a gall stone impacted in the ductus communis choledochus, otherwise there would have been an obstructive jaundice with the characteristic deep tint seen in the patient. The right treatment was to expose the gall bladder, pack it off from the general abdominal cavity, carefully open it, and remove all gall stones from it, and from the cystic duct. The gall bladder should then be sutured to the deep abdominal wall, and a drain tube inserted through the wound.

Novelties and Notices.

A GUIDE TO DIABETIC COOKERY.

(Messrs. Callard & Co., 74, Regent Street, London.)

Messrs. Callard & Co. have issued a very useful little pamphlet on the preparation of food for patients afflicted with diabetes. Recognising how difficult it is for the ordinary housekeeper to provide a varied diet for such patients, these food specialists have very carefully compiled 151 recipes for the preparation of different kinds of suitable food. These recipes include soups, sauces, meats, entrées, puddings, cakes, biscuits, and bread, and have been designed with a view to all possible economy, for the quantities given are such as will be convenient for making dishes for one person. As no two cases of diabetes present exactly the same features, or require exactly the same treatment, the medical attendant has here, ready to hand, a sufficiently varied repertoire from which to select a suitable dietary. There is appended a valuable list of articles which a diabetic patient may eat and drink, and also a list of solids and liquids which must be avoided.

Messrs. Callard & Co. have recently erected a new factory in Soho for the production of their dietetic preparations. The latest electric machinery has been installed, and, as the ovens are heated by hot air, the bakery section of the building is kept in a state of hygienic perfection. Messrs. Callard are always glad to send a supply of samples at the request of a medical man, or, if preferred, to his patient.

EUCAINE LACTATE.

(Messrs. Burroughs Wellcome & Co., London.)

The anæsthetic power of this useful salt of eucaine is equal to that of cocaine salts, but it has the advantage of being non-toxic, non-irritating, and it does not constrict the blood vessels, or dilate the pupil. Its different percentage solutions,

for it is very soluble, are used for ophthalmic purposes, for laryngoscopy and rhinoscopy, for the removal of tonsils, and also in dental and general surgery. The following preparations are issued :—

"Tabloid" Hypodermic Eucaine Lactate gr. $\frac{1}{3}$ and gr. 1, in tubes of 20. "Soloid" Eucaine Lactate gr. 1 and gr. 5, in bottles of 25.

THE MAS-DE-LA-VILLE NON-ALCOHOLIC WINES.

(Messrs. Ingersoll & Melluish, 6 and 8, Eastcheap, London, E.C.)

These wines are sold in three brands, Château Peyron (still), L'Arlésienne (sparkling), and Grand Mousseux Champagne, at popular prices, and apparently contain no trace of alcohol. They consist solely of the juice of freshly gathered grapes, which is kept from fermenting by the process known as "Pasteurization," and without the addition of any chemicals.

Those who desire a wholesome, refreshing, and stimulating temperance drink will probably find their wants supplied by the use of these wines.

THE WHITE VINOLIA BAR.

(The Vinolia Co., Limited, Malden Crescent, London, N.W.)

The Vinolia Company has sent us some samples of their well-known and excellent soaps and toilet preparations, amongst the former is the *White Vinolia Bar*. This soap is the only household soap which contains no rosin ; it lasts longer and washes clothes whiter than those household soaps which are not white. It can be used for general household purposes, for flannels, woollens, linens, and laces. This soap has the advantage that the skin is not stained by it, and may therefore be used by those who have delicate skin.

COMPETITIONS.

We offer our readers every month two Prizes on the conditions stated below.

A Prize of Two Guineas will be given to the author of the best Essay on a subject to be announced by the Editor.

A Prize of One Guinea will be given to the competitor who writes the best answers to three questions relating to Medical or Surgical Cases.

Results of the February Competitions will be announced in the April number.

a.—The Subject of the Essay for March will be

The Treatment of Bronchiectasis.

b.—Answers to the following questions are invited :—

1. What complications may result from carious teeth ?

2. What is the usual condition of the joint under a bunion ?

3. A man, aged thirty-seven, sustains, from a long, sharp-pointed, narrow-bladed clean knife, a deep punctured wound of the thigh in the region of the apex of Scarpa's triangle. He loses several ounces of blood, and faints. The wound is dressed antiseptically, and a very firm bandage is applied over the dressing. He is kept in bed with the limb well raised and bandaged. In four days, the external wound has completely healed. In ten days, he gets up and insists upon resuming his work as a carpenter; but, at the end of the first day's work, he experienced in the neighbourhood of the original wound a dull pain, which increased and became much more acute. He then sent for his doctor, who detected a small pulsating swelling on the site of the original wound. The next day it was found that the swelling had suddenly increased in size, its definition was lost, and the whole limb had become œdematous.

What is the diagnosis of the case? What treatment would you have adopted?

GENERAL CONDITIONS.

A.—All MSS. relating to the Essay must be marked on the top left-hand corner "Essay," and must be sent to the Editor of The Practitioner, 149, Strand, W.C., on or before the 2nd day of April, 1906. The answers to the above Questions must not exceed eight hundred words.

B.—All MSS. giving answers to the Questions must be marked on the top left-hand corner "Questions," and must be sent to the Editor on or before the 2nd day of April, 1906.

C.—No Essay will be returned unless a special request is made, accompanied by a stamped addressed envelope.

A and B.—(1) One side of the paper only must be written on.

(2) The name or pseudonym, and address of the competitor must be clearly written on each sheet of paper used.

(3) The decision of the Editor is final.

(4) Competitors must be registered General Practitioners.

(5) The attached Coupon must be filled up by each competitor.

THE PRACTITIONER.

APRIL, 1906.

DIETETICS.

By D. NOËL PATON, M.D., B.Sc., F.R.C.P. (Ed.),

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The object of feeding is twofold, first to supply energy for growth, mechanical work and heat production, and secondly to yield the materials for the building up and repair of the tissues.

The constituents of the food which subserve one or both of these purposes are Proteids, Fats, and Carbohydrates.

I.—CHEMICAL NATURE OF FOODS.

The chemical nature of these Proximate Principles may be dismissed in a very few words.

The Proteids, or albuminous foodstuffs, are substances of large and complex molecules containing carbon, hydrogen, oxygen, nitrogen, sulphur and often phosphorus. They may be decomposed into a large series of monamido and diamido acids, some of which are linked to a benzene nucleus, and into amides such as urea.

The simplest proteid molecules tend to unite with one another to form more complex molecules, the largest of which constitute the native proteids—the globulins and albumins.

The Fats are ethers formed from the triatomic alcohol glycerin by the replacement of three hydrogen atoms by the radicles of the fatty acids :—

Glycerol { Fatty acid. „ „ „ „

These molecules are large and contain a very small amount of oxygen.

The carbohydrates, or sugary foods, are aldehydes, ketones and derivatives of these of the hexatomic alcohol mannite.[1] The simplest members of the series, the single sugars, have the formula $C_6H_{12}O_6$, and of these dextrose or blood sugar is of the most importance. Double sugars are produced by two molecules combining with the loss of water. Of these cane sugar is a type. By further polymerisation of many molecules with a further loss of water, the polysaccharides are formed. The most complex is starch, and between this and simpler sugars a series of compounds of intermediate complexity, the dextrins, exists.

Other substances, such as alcohol, are capable of being used as sources of energy to a small extent, but their utilisation is so trivial that they cannot be classified as foods.

II.—DIGESTION OF FOODS.

These proximate principles of the food undergo a process of digestion before they are taken up from the alimentary canal and made part of the living tissues. The starches are broken down into single sugars by the action of the saliva, pancreatic juice, and succus entericus. The fats are split into glycerin and fatty acids by the action of the pancreatic juice, and the fatty acids combine with the alkalies of the intestine to form soaps. The complex proteids are first broken down into the simplest form, the peptones, by the action of the gastric and pancreatic secretions, and these peptones are still further broken down into amido-acids by the action of these secretions and of the erepsin of the succus entericus.

It has been for long recognised that the simple peptone molecules which leave the intestine are again built up into the more complex molecules of the native proteids which occur in the living tissues of the body ; but the discovery of the further splitting of these peptones into simpler bodies by the action of erepsin indicates that the synthetic action of the animal body, whereby the native proteids are re-constructed from

[1] It is unnecessary here to consider the pentoses, which contain five carbon atoms in the molecule.

these, is even more extensive than was previously recognised. The question of how far these decomposition products of proteids are available for the building up of tissues has recently received a good deal of attention. Löwe and Henriques and Hansen, from feeding experiments, conclude that at least some of the products of the prolonged action of trypsin and erepsin on proteids can be so used.

Pawlow and his collaborators have shown that the digestive organs adapt their activity in the most remarkable way to the kind of food which has to be dealt with.

This is well illustrated by experiments carried out in his laboratory upon dogs with pancreatic fistulæ. The effects of diets of milk, bread, and flesh were compared, in each case the amount of the food given containing the same amount of proteid. The total quantity of each ferment was calculated by multiplying the quantity of the juice in c.cms. by the digestive activity of unit of volume. The following table indicates the results obtained:—

Diet.	Quantity of Enzyme.		
	Proteolytic.	Amylolytic.	Fat Splitting.
Bread, 250 grm. - -	1,978	1,601	800
Milk, 600 cc. - - -	1,085	432	4,334
Flesh, 100 grm. - -	1,502	648	3,600

Bread contains a proteid difficult of digestion, plenty of starch, and little fat. Milk contains an easily digested proteid, and plenty of fat, but no starch; while flesh contains a comparatively easily digested proteid, no starch, and some fat. The first food causes a copious production of proteid digesting and starch digesting enzymes, and little fat splitting enzyme. The second causes the production of less proteid digesting, little starch digesting, but most fat splitting enzyme. The last causes a moderate production of proteolytic, little amylolytic, and a comparatively large amount of fat splitting enzyme.

III.—ABSORPTION OF FOODS.

Form of Absorption. — The carbohydrates are largely absorbed from the intestine as single sugars, and of these the most important is dextrose.

The fats are absorbed as fatty acids, or as soaps.

The proteids are absorbed either as peptones, or as the amido-acid derivatives of these.

Mode of Absorption.—It is impossible to explain the absorption of the final products of the various foodstuffs by the ordinary known mechanical processes of filtration, or osmosis :—

1. Heidenhain has shown that absorption of water from the intestine takes place much more rapidly than diffusion through a dead membrane.

2. The relative rate of absorption of different substances does not follow the laws of diffusion. Grübler's peptone passes more easily through the intestine than glucose, but glucose passes more readily through parchment paper, while sodium sulphate, which is more diffusible than glucose, is absorbed much less readily. Again, as shown by Reid, an animal can absorb its own serum under conditions in which filtration into blood capillaries or lacteals is excluded. In such a case osmosis cannot play a part.

3. Absorption is stopped or diminished when the epithelium is removed, injured, or poisoned with fluoride of sodium, in spite of the fact that this must increase the facilities for osmosis and filtration.

Absorption is thus dependant on the vital action of the epithelial lining of the alimentary canal.

Channels of Absorption.—There are two channels of absorption from the alimentary canal—the veins which run together to form the portal vein of the liver, and the lymphatics which run in the mesentery, and, after passing through some lymph glands, enter the *receptaculum chyli,* from which the thoracic duct pours its contents into the blood-stream.

1. *Proteids.*—Since peptones and the further products of their digestion are not found in the blood, they must undergo a change in the intestinal wall before passing to the tissues. That in some altered condition they leave the intestine by

the blood, and not by the lymph, is shown by the fact that their absorption is not interfered with by ligature of the thoracic duct.

During the digestion of proteids the number of leucocytes in the blood is enormously increased, sometimes to more than double their previous number, and in all probability it is they which carry the products of digestion from the intestine. According to the observations of Pohl, the leucocytes are derived from the lymph-tissue in the intestinal wall, but more recent experiments by Goodall and myself tend to show that they chiefly come from the bone marrow, being probably attracted to the intestine by a positive chemiotaxis. By breaking down in the blood-stream they probably set free the proteids for use in the tissues.

When an excess of proteids is taken in the food, is broken down in the lining membrane of the gut, some of the nitrogen forming such compounds as carbamate of ammonia, an immediate precursor of urea.

Its non-nitrogenous part probably yields carbohydrates, since a proteid diet may lead to the accumulation of these substances in the liver. The ammonia compounds are carried to the liver and there changed to urea, and excreted as such. Thus the entrance of an excess of nitrogen into the tissues is prevented.

2. *Carbohydrates.*—Although the chief single sugar formed in digestion is dextrose, others are also produced—lævulose from cane sugar, and galactose from milk sugar. All these are absorbed in solution, and are carried away in the blood by the portal vein.

3. *Fats.*—The fats, after being split up into the component acids and glycerin, pass as soluble soaps, or as fatty acids dissolved in the bile, through the free borders of the intestinal epithelium. Here they are again converted into fats by a synthesis of the acid with glycerin. Fine fatty particles are found to make their appearance in the cells at some distance from the free margin and to increase in size. They are passed on from the cells, through the lymph tissue of the villi, into the central lymph vessels, and thence by the thoracic duct to the blood-stream. Unlike the proteids and carbohydrates, they are not carried directly to the liver.

IV.—FATE OF FOOD ABSORBED.

I.—When the food absorbed is just sufficient to meet the requirements of the body, it is at once used either as a source of energy for the work of the construction and repair of the tissues, for the production of mechanical work, and for the production of heat; or as material for the construction and repair of the tissues.

The carbohydrates and fats are oxidised to CO_2 and H_2O and are eliminated as such; the proteids are oxidised to the condition of urea, CON_2H_4, which is excreted in the urine.

It is by these decompositions of complex molecules that energy is liberated, and the amount of energy set free may be determined by ascertaining the amount of heat evolved in their combustion, since, from the amount of energy liberated as heat, the energy available for other purposes may be calculated. To determine this the range of temperature through which a given weight of water is heated may be measured by some form of calorimeter, the amount of heat required to raise one kilogramme of water through one degree centigrade—the Calorie being taken as the unit of heat. The carbohydrates and fats are oxidised in the body to the same extent as they are oxidised in combustion in the calorimeter, so it is easy to find their energy value. The energy evolved from proteids in the body is not so simply arrived at, because they are only oxidised to urea. But since 3 grms. of proteid yield 1 grm. of urea, by determining the heat evolved by any weight of proteid in the calorimeter, and by ascertaining the heat given off by the combustion of the urea which would be yielded by this amount of proteid, and subtracting the second from the first, the amount of heat given off from proteids in the body may be determined.

In this way it is found that—

1 gramme of proteids yields 4·1 Calories of energy.
1 gramme of carbohydrates yields 4·1 Calories of energy.
1 gramme of fats yields 9·3 Calories of energy.

But a certain amount of energy is required in the digestion and absorption of these different substances. Zuntz and Levy found that a diet of white bread and butter given to a fasting

animal increased the metabolic processes by an amount equivalent to about 10 per cent. of the energy value of the diet. Obviously, therefore, only 90 per cent. of the energy was available for the actual "work" of the body.

II.—When food is in excess of the immediate requirements, it may be stored for future use.

This storage takes place chiefly in three situations:—(1) fatty tissue; (2) muscle; (3) liver.

1. *In Fatty Tissues.*—In most mammals the chief storage of surplus food is in the fatty tissues.

(*a*) That the *fat* of the food can be stored in them is shown by the fact that the administration of large amounts of fats, different from those of the body, leads to their appearance in those tissues.

(*b*) The fats of the body are also formed from the *carbohydrates* of the food. Feeding experiments upon pigs and other animals have definitely proved that sugary foods are changed to fat in the body and stored in that form. The following may be given as an example of such experiments. Two young pigs of a litter were taken, and one was killed and analysed. The other was fed for weeks on maize, the amount eaten being weighed and the excretion of nitrogen by the pig being determined. The animal was then killed and analysed, and it was found that the fat gained was more than could be produced from the fat and proteid of the food eaten. It must, therefore, have been formed from the carbohydrates.

(*c*) There is good evidence that in excessive *proteid* feeding the non-nitrogenous part of the proteid molecule may be stored as fat, at least in carnivorous animals. Thus, a dog fed on lean meat does not lose all his fat. It has recently been maintained that the evidence in favour of the formation of fats directly from proteids is unsatisfactory; but since proteids yield carbohydrates, and since carbohydrates form fats, it must be admitted that proteids may be a source of fats.

2. *In Muscle.*—Some animals, as the salmon, store fats within their muscle fibres; but in mammals such a storage is very limited in amount. The salmon also stores surplus proteid material in the muscles, and mammals too appear to do the

same. How far this storage may occur in normal mammals is not known, but feeding experiments indicate that only a small amount of proteid can be accumulated. After debilitating diseases, such as fevers, very large quantities of proteids may be rapidly laid on; and the experience of athletic training shows that the muscles may be enormously increased by the building up of the proteid of the food into their protoplasm. Glycogen also is stored in the muscles.

3. *In the Liver.*—Bernard long ago demonstrated the manner in which any excess of carbohydrates in the food is stored in the liver as glycogen, and more recently I have shown that the storage in the liver of fats from the food is very marked in many animals, *e.g.*, the cat. The liver is a storehouse of carbohydrates and fats; and lecithin—the great phosphorus containing fat—is always present in the liver, even in prolonged fasting.

THE SPECIAL PART PLAYED BY EACH CONSTITUENT OF THE FOOD.

1. *As Tissue Builders.*—The proteids are generally considered as the only true tissue builders and repairers, and certainly this is their special value in the diet. Muscle and other tissues consist chiefly of proteids, and it is from the nitrogen-containing proteids alone that they can be built. Of course, if it is proved that the various amido-acids formed by the digestion of proteids are capable of being used in the construction of the tissues, this may imply that these are synthesised with the carbohydrates, or fats, to produce proteids afresh. Since the fats and carbohydrates do not contain the necessary nitrogen and sulphur they are not alone sufficient for the construction of living tissues.

2. *As Energy Yielders.*—The relative energy value of the various proximate principles has been already considered. Carbohydrates and proteids may be considered as of equal value; fats as having twice the value of either of these.

Gelatin, which so closely resembles the proteids in its composition and reactions, cannot be used as a tissue builder, but it is of equal value with the proteids and carbohydrates as a source of energy.

Alcohol.—The influence of alcohol may be considered under two heads.

1st. Before absorption. Moderate doses of alcohol taken along with food do not appear to interfere with digestion and absorption. When taken apart from food and in such excessive doses as to act as an irritant and to cause catarrh of the alimentary canal, alcohol, of course, has a prejudicial influence upon these processes.

2nd. After absorption. The tissues have the power of oxidising a small quantity of alcohol, and since the combustion of 1 grm. of alcohol liberates 7·06 Calories of energy, alcohol must be regarded as a food just in the same way as sugar is a food. The amount of alcohol which can be thus oxidised varies in different individuals and in the same individual at different times, but the average man cannot use more than 50 grms. per diem. This should liberate no less than 350 Calories of energy, an amount equal to that yielded by 85 grms. of proteid, or of sugar. Any amount of alcohol taken above the amount which can be oxidised acts as a poison to the protoplasm in its passage through the body, first diminishing its activity and so diminishing the rate of waste, and secondly, causing the death of the protoplasm and the removal of the broken-down nitrogenous constituents in the urine. Its poisonous action on the liver is demonstrated by the diminished building up of urea, so that a greater quantity of waste nitrogen is excreted in other forms. In moderate doses it stimulates the heart and dilates the arterioles. Its action in checking the activity of metabolism, along with its influence in producing dilatation of the cutaneous vessels, is taken advantage of in its use in the treatment of high temperature in fevers. Its high energy value and the ease with which it is absorbed render it of service in various conditions of debility.

V.—ENERGY AND PROTEID REQUIREMENTS OF THE INDIVIDUAL.

These vary with the size of the individual, and hence the dietary requirements have to be considered in relationship to the weight of the persons concerned.

Other things being equal, a large man requires more energy and more proteid than a small man. For this reason the

energy requirements are sometimes stated as per unit of weight; but it is more convenient to take as the standard an adult man of average weight, say 65 kgs. It must further be remembered that the smaller the animal the greater the surface in proportion to its weight; and hence the greater the loss of heat per unit of weight. For this reason alone, small animals and children require more energy per unit of weight than larger animals, or older people.

The *age* of the individual has also a marked influence. In children the metabolism is more active than in adults. They are more constantly in motion, and they require energy and material to build up their tissues, and, as just stated, the loss of heat per unit of weight is greater than in their elders. Weight for weight, a child thus requires a greater supply of energy than a man. The following results, based upon observations on diets recorded by Camerer, illustrate this:—

Age.	Weight in Kilos.	Energy used per Kilo. of Body Weight in Calories.	Total Energy in Calories.
4 - - -	14	91·3	1,280
12 - - -	30	57·7	1,730
30 - - -	66	42·4	2,800

The dietary requirements of children at different ages may thus be stated in terms of the requirements of an adult man doing average work. Atwater formulates this as follows:—

Taking a man at	- - -	1·0
A woman is equivalent to	- -	0·8 of a man.
A boy of 14 to 16 is equivalent to	-	0·8 „
A girl „	„ -	0·7 „
A child 10 to 13	„ -	0·6 „
„ 6 to 9	„ -	0·5 „
„ 2 to 5	„ -	0·4 „
„ under 2	„ -	0·3 „

This table is of considerable use in studying family dietaries.

A.—*Energy Requirements.*

Since the extent of chemical change varies directly with the activity of the muscles, the amount of energy which must

be supplied in the diet is determined by the amount of energy which has to be evolved for mechanical work and heat production by the muscles.

To determine the actual energy requirements of an individual, various methods of study may be adopted.

1. An attempt may be made to measure the output of energy as mechanical work and as heat. Taking the case of a man doing a moderate day's muscular work equivalent to 150,000 kgms. or 350 Calories, he gives off, according to N. Stewart's calculations (*Manual of Physiology*, p. 425), 2,590 calories of heat. The loss of energy is thus:—

	Calories.
In external muscular work, equivalent to -	350
As heat - - - - -	2,600
Total - - - - -	2,950

It is true that such a calculation gives a return of only one-eighth of the energy of the food as mechanical work, while Zuntz has shown that, under specially favourable conditions, as much as one-third of the energy may be yielded in this form. It may, therefore, be urged against this method that, while the amount of energy for mechanical work is determined by the labour to be undertaken, the loss of energy as heat may be governed by the amount of food taken, since, unless this is stored, it has to be burned off at once, and must thus yield energy as heat.

2. A study of the composition and energy value of diets, which are sufficient to maintain the weight and health of individuals doing different amounts of work, should give some measure of the dietary requirements.

This method has been very largely adopted, but it has been urged against it that it does not necessarily express the minimum requirements since, as explained above, any excess of food may be simply oxidised and its energy eliminated as heat. Several observations have, however, been made which invalidate this objection, and which show that the method is reliable. One of these may be cited.

Dr. J. C. Dunlop, in his investigation of the prison dietaries

of Scotland, found that, among one class of convicts at Peterhead, a great deal of the food supplied was unused, and upon calculating the energy value of the diet, he found that it amounted to 3,928 Calories, that, in fact, it greatly exceeded what is generally considered as sufficient for individuals doing such moderate labour as that upon which these convicts were engaged.

On his recommendation, the diet was, therefore, reduced, so that it should yield 3,517 Calories, an amount which he considered to be theoretically an adequate supply of energy. At once all waste stopped, complaints became rife, and the prisoners lost weight.

A slice of bread per diem was added to the diet, raising its energy value to 3,707 Calories, and since then complaints have decreased and the weights of the prisoners have been maintained.

It seems highly improbable that among the very poor a diet more than sufficient to maintain health and vigour will be adopted, and, therefore, if we find that anything like a common standard is aimed at by the labouring classes of many different nationalities, it seems justifiable to assume that this is a measure of the energy requirements of that class.

The question has been largely studied in this country, in America, on the continent of Europe and in Japan, and it is found that when calculated as for a man of average weight, *i.e.*, 65 kilos., the daily food generally yields something between 3,000 and 3,500 Calories. From a very extensive series of investigations in America, Atwater has formulated the energy requirements in different conditions of life as follows :—

	Calories.
Man without muscular work - - -	2,700.
„ with light muscular work - -	3,000.
„ „ moderate muscular work - -	3,500.
„ „ severe muscular work - -	4,500.

It must, of course, be remembered that all the energy of the constituents of the diet is not available, since a considerable and varying proportion of the food is not digested, or absorbed. The *gross* energy of the diet must, therefore, be well above the *net* energy requirements of the body.

3. By gradually and steadily decreasing the diet while maintaining the muscular work, it might be possible to find the smallest supply of energy in the food upon which the work could be done without loss of vigour, or loss of weight.

This method has been employed by Chittenden (*Physiological Economy in Nutrition*), who concludes that a less supply of energy than 3,000 Calories is sufficient for moderate muscular work. But since his investigations bear more directly on the next question to be considered, the minimum necessary supply of proteid, their discussion will be postponed.

B.—*Proteid Requirements.*

A certain quantity of proteid must be present in any diet capable of maintaining life, because proteids are not merely a source of energy, but are *the* constituent of the diet which alone can be used for the building and repairing of the muscles.

Bearing in mind the fact that any excess of proteid in the food is broken up before it becomes available for the muscles, and that any portion conserved for use is nitrogen-free and in the condition of a fat, or carbohydrate, it becomes desirable to enquire what is the *best* amount of proteid for a diet to maintain health and vigour.

This is the problem to be considered rather than the question of what is the *smallest* amount of proteid which is sufficient. For, if the proteids are reduced too far, it may be difficult to supply all the energy required from carbohydrates and fats.

The question may be investigated by two methods :—

1st. By determining what is the amount of proteid contained in the diets of people of different nationalities.

2nd. By finding how far the supply of proteid may be cut down without interfering with the health and vigour of the individual.

The first method is open to the objection that the amount of proteid taken may be determined, not by the actual requirements of the individual, but by custom, and by the extent to which proteids form a constitutent of the food most readily obtained. But since, in civilised countries, proteids, and more especially proteids from animal sources, are expensive

constituents of the food, it is unlikely that the very poor will take a greater amount than they find to be necessary.

The second method is open to the objection that the minimum amount of proteid, upon which a certain number of individuals can maintain health, is not necessarily a measure of the amount upon which the vast majority of mankind can maintain themselves in the state of greatest efficiency.

1st. The first method shows very clearly that, among all peoples studied, the diet, unless poverty prevents it, contains over 100 grms. of proteids per man per diem, taking men of the average size of Europeans and Americans; and that when prolonged and sustained muscular work has to be undertaken a very considerably larger amount is used. Thus, in an investigation on the diet of the poorer labouring classes in Edinburgh (15 families), Drs. Dunlop, Inglis, and I found that the food per man per diem contained—

Proteids	107 grms.
Calories	3,233

The studies of Rowantree in York and of Lumsden in Dublin confirm these results for this country, while in America it was found that in the poorest parts of three large towns the following amounts were used:—

	Chicago, 25 families.	Philadelphia, 26 families.	New York, 19 families.
Proteids	119 grms.	109 grms.	106 grms.
Calories	3,425	3,235	3,030

Among factory operatives and labourers, presumably earning a fair wage, the following average values were found:—

	Proteids.	Calories.
Germany	143	4,170
Sweden	161	4,080
Russia	113	3,061
America:—		
Factory operatives	127	4,415
French Canadian	123	4,620
Labouring class (French Canadian)	108	3,585

——	Proteids.	Calories.
America :—		
Professional men - - -	104	3,325
Mechanics' families - - - -	103	3,465
Farmers' families - - - -	97	3,515

As examples of the diets of other races the following examples may be given :—

——	Proteids.	Calories.
Chinese :—Truck farm labourers, California -	144	4,100
Negroes in Virginia, 19 families - -	109	3,745
Japanese rice cleaner - - - -	118	4,415

Kellner and Mori give the following figures for the diet of the Japanese—a much smaller race than the Chinese, American, or European races :—

——	Proteids.	Calories.
Vegetable diet (poorest class) - - -	71	2,026
Medium mixed diet - - - -	109	2,423
Abundant ,, ,, - - - -	123	2,402

The more extended studies recorded in Bull. 159 of the United States Department of Agriculture, from which the diet of the rice cleaner given above is taken, show that the diet of the Japanese is of equal proteid and energy value with that of Americans when considered as for men of average American size.

An examination of these studies in detail reveals very clearly that only as a result of poverty does the intake of proteid fall below 100 grms. and the intake of energy below 3,000 Calories.

2nd. Many experiments have been undertaken to ascertain what is the smallest intake of proteids which is sufficient to make good the loss of nitrogen and to maintain health, but by far the most important are those recorded by Professor Chittenden in his *Physiological Economy in Nutrition.*

He has recorded a prolonged series of investigations by which he shows that in 5 professional men for periods of from seven to nine months, in 8 student athletes for from four to seven months, and in 13 soldiers for five months, a nitrogenous equilibrium and perfect physical and mental health could be maintained with an intake of from 35 to 56 grms. of proteid per diem.

The work done by these individuals is not recorded, but from the daily routine of the soldiers, whose chief work appears to have been two hours' exercise in a gymnasium, it must be classed as very moderate. The fact that the energy value of the diets in the case of the soldiers was only 2,500 to 2,800 Calories seems to confirm the opinion that they were not called upon to do severe work.

While these results certainly prove that men can maintain health and muscular efficiency for long periods on about half the amount of proteid which is usually consumed, they do not demonstrate that, in the case of those subjected to strenuous and sustained muscular work, such a reduction is desirable, nor do they indicate that in growing children a reduction in the amount of proteids usually consumed may be safely allowed.

Fletcher maintains that by eating slowly, and deliberately masticating the food, the digestibility and absorbability is so enormously increased that the amount required is markedly decreased. Even if the whole 10 per cent. of the proteids of the food, which on an average on a mixed diet escape absorption and appear in the fæces, were utilised by this more elaborate mastication, the decrease of 50 per cent. in the necessary consumption of proteid indicated by the experiments of Chittenden would not be explained, and the conclusion is inevitable that many adults can live in a thoroughly efficient state on an intake of about half the amount of proteids usually taken.

One danger of a persistently low proteid supply seems to be that the body loses its power of taking up a greater amount when that is required. Now, in all those experimented on by Chittenden, there was an initial loss of weight which was not generally regained, and the question of whether, if desired, the muscular system could have been again increased, remains

unsolved. Apparently the subjects of the experiments found difficulty in going back to an ordinary diet. The further question of how the reparative processes would proceed during and after such an exhausting disease as a fever has not yet been elucidated.

While freely admitting that an excess of proteid over that required by the body is wasteful, we hesitate, even on the evidence so clearly adduced by Chittenden, to be frightened by the bogey of the dangerous character of a moderate proteid excess. Because large doses of adenin, creatin, or creatinin produce toxic symptoms (Chittenden, p. 457), we have no right to assume, without a scrap of evidence, that the liberation of small quantities of these is necessarily in any way harmful in the healthy body.

Considering the fact brought out by Chittenden's work, that a diminished proteid diet seems to decrease the power of using proteid, we should be inclined to risk the problematic danger of the production of toxins rather than face the very real danger of being unable to digest and assimilate a liberal supply of proteids when these are required.

c.—*Part played by Carbohydrates and Fats in the Diet.*

It has been shown that carbohydrates and fats are not directly available as muscle builders and repairers, but that the former are of equal energy value with, and the latter of twice the value of, the proteids.

The amount consumed will depend upon the amount of energy required and upon the amount of energy obtained from proteids.

Thus, supposing that 3,000 Calories of energy are required, and that 100 grms. of proteid are contained in the diet; this will yield 410 Calories, and thus 2,590 Calories must be supplied from carbohydrates and fats.

In determining the proportionate amounts of these, two factors have to be considered—first, the relative cost, and second, the limitation of the power of digestion of each.

Carbohydrates are enormously cheaper than fats as a source of energy. Margarine at 8d. per lb. will yield 435 Calories for a penny, while sugar at 2½d. per lb. will yield 1,860 Calories

for the same sum. But the use of carbohydrates as a source of energy is limited by the fact that in most individuals digestive disturbances are apt to supervene if more than from 500 to 600 grms. are consumed.

A diet should, therefore, not contain much more than 500 grms. of carbohydrates, and these will yield 2,050 Calories of energy.

This leaves about 950 Calories to be supplied by fats, an amount which is nearly met by 100 grms. of fat yielding 930 Calories of energy. This quantity of fat most people can easily digest.

A typical diet for an average man doing moderate muscular work would thus be—

	Amount.	Energy Value in Calories.
Proteids - - - - -	100	410
Carbohydrates - - - -	500	2,050
Fats - - - - -	100	930
		3,390

or very nearly the 3,500 Calories.

A reference to Atwater's table gives the dietary requirements of a woman, or of a child of any age, and thus renders it easy to make out the diet of a family, or public institution.

Among the Japanese, who use rice so extensively in their diet, the tendency is to consume a larger amount of carbohydrates and a smaller amount of fat.

THE DIET MUST BE CAPABLE OF DIGESTION, ABSORPTION, AND ASSIMILATION.

While proteids, carbohydrates, and fats in the alimentary canal undergo the changes already described, they are frequently, when taken in the food, in an unfavourable state for the action of digestive juices. Thus, while the proteids of flesh are exposed to the gastric and pancreatic secretion, the proteids of many vegetables, unless carefully prepared, cooked, and masticated, are protected and escape digestion and

absorption. The same may be said of the crude starch of vegetables. The digestibility and value as an article of diet of the cellulose and allied substances in plants are important questions at present requiring further investigation.

The fats of vegetables are also generally in a less favourable state for digestion than the fats of animals.

When once digested there seems to be no difference in the absorbability and assimilability of the proximate principles of vegetables and animals; a given weight of vegetable proteid may be substituted for the same quantity of animal proteid.

As a result of the difference in digestibility the *availability* of foodstuffs varies. The following table shows some of these variations:—

Absorption of Foodstuffs.

	Per Cent. Absorbed.		
	Proteid.	Fat.	Carbohydrate.
Flesh	97	95	—
Egg	97	95	—
Milk	89-99	96	100
Bread	78	—	99
Potatoes (boiled)	68	—	92
Carrots (raw)	61	—	82

The availability of almost any article of food varies with the state of the teeth and the digestive organs of the individual, with the manner in which it is eaten, whether leisurely or too rapidly and without proper mastication, and with the manner in which it is prepared. For example, the mode of manufacture of the flour used in bread-making has a very marked influence upon the amount digested and absorbed. In vegetable foods especially, the thoroughness of the cooking has a most important influence on the availability of their constituents.

By *assimilation* is meant the taking of the food constituent from the blood by the muscle and other tissues so that it may be used; for until the constituents of the food have become

part of the protoplasm of the tissues they are not oxidised. Apparently the only substances, which can be freely assimilated and used by the tissues, are the three proximate principles of the food, although alcohol and possibly some other similar substances may be utilised to a small extent. This is one of the reasons for the desirability of the presence of at least 100 grms. of proteids in the daily food. For, were a much smaller supply of energy afforded by them, the carbohydrates which would have to be consumed would be greater than the digestive capacity of the alimentary canal could deal with. Of course the energy required might be made good from fats, but the power of digesting fats has also its limitations, while their cost is relatively high.

THE INFLUENCE OF THE CONDITION OF LIFE OF THE INDIVIDUAL.

1. *Infancy.*—The natural food of the infant is the mother's milk, the average composition of which is something as follows :—

	In 100 grms. of Milk.	
	Grms.	Energy Value in Calories.
Proteids - - - - -	1·0	4·1
Fats - - - - - -	3·5	32·5
Carbohydrates - - - -	6·5	26·6
		63·2 Calories.

Thus, even in this period of rapid growth of muscle and other tissues, the supply of proteids bears a smaller proportion to the supply of fats and carbodydrates than in the typical diet of the adult. In milk the proteids supply only $\frac{1}{15}$th of the energy, while in the ordinary diet of the adult they supply no less than $\frac{1}{6}$th.

Jaffe's (*Bull. U.S. Depart. of Agriculture*, No. 84) analyses of the daily diet of infants up to two years of age illustrates this point. In four out of six children under five

months of age, the proteids of the food yielded from $\frac{1}{11}$th to $\frac{1}{18}$th of the energy, while in two upon artificial diets the proteids yielded $\frac{1}{7}$th. The food of two of the children which, when they were under five months, contained $\frac{1}{15}$th of the energy in proteids, at the age of between seven and nine months, yielded $\frac{1}{8}$th and $\frac{1}{9}$th of the energy in this form, and between 17 and 22 months $\frac{1}{6}$th and $\frac{1}{4}$th.

In milk the carbohydrate—lactose—is in a condition requiring little digestive preparation, and thus the dangers of overloading the alimentary tract with undigested products in supplying large amounts of carbohydrates is obviated.

It is possible that the small proportion of proteids in milk, no less than its poverty in iron, limits the duration of the period upon which a milk diet is sufficient for a child. The introduction of some cereal such as wheaten flour with its 10 per cent. of proteid, or some form of flesh with 20 per cent. of proteid, will at once raise the proportion of proteids in the diet.

2. During *childhood*, when growth is active and metabolism rapid, an adequate supply of proteid, and an abundant supply of energy are requisite. It is in childhood that a deficiency in the supply of proteid has the most prejudicial effect, and Camerer's demonstration of the more active metabolism in the child indicates the necessity of a liberal supply of energy. But the supply of proteid, although adequate, should not be excessive, for the power of assimilation is not determined by the amount supplied, and any excess simply throws extra work upon the organs of excretion. Hence, even in childhood, it is unnecessary that proteids should yield more than $\frac{1}{5}$th of the total energy of the diet.

3. In *adolescence*, the activity of the constructive processes are somewhat in abeyance, but the great demand for energy must be supplied by an abundant food. And it is highly probable that this may very well be done by a liberal supply of carbohydrates and fats.

At this period of life the influence of diet on the reproductive organs has to be considered. On the one hand, it is important that these should develop properly and reach maturity when growth has stopped. On the other hand, it

is undesirable for physiological, quite apart from ethical, reasons that their growth should be artificially stimulated by diet.

On the precise influence of diet upon the reproductive organs, our knowledge is practically nil, and without more direct evidence it is unwarrantable to assume, as many do, that a proteid or flesh-rich diet has a specially stimulating action on the generative, as distinguished from the other organs. What is required is not vague theorising but definite experimental evidence on the subject.

4. In *adult life*, the dietary requirements are conditioned by the sex and mode of life of the individual.

A. *Males.*—The diet of males of the *labouring class* has been already considered. The main object of taking food is to build up and maintain a large and active muscular system, and to supply it with an abundance of energy-yielding material from which it can render the energy kinetic and available. The greater the work to be done, the greater must be the supply of energy.

This is well illustrated by the careful study on a pedestrian made by Caspari. Using the figures afforded by the investigations of Zuntz and his co-workers, Caspari calculated that in one competition this pedestrian liberated no less than 12,410 Calories of energy in the 26 to 27 hours he took for his walk, or about four times the energy supplied in the ordinary labourer's diet. The studies by Atwater and his colleagues of the diets of labourers in America, performing very hard work, show that these enormous demands for energy are met by a proportionately increased supply.

We may give one or two examples.

Diet of brickmakers in Middletown, Conn.:—

Proteids	222
Fats	265
Carbohydrates	758
Calories	6,464

Diet of two lumber-men in Maine (chopping and yarding):—

Proteids	206
Fats	387
Carbohydrates	963
Calories	8,140

Diet of jinrikisha man in Japan :—

Proteids	158
Fats	26
Carbohydrates	1,031
Calories	5,050

If, by supplying sufficient energy in the diet, enormous amounts of work can be performed, the economic question naturally presents itself of whether employers of labour would not find it to their advantage to supply very liberal diets to their workmen.

One brickmaker in America is reported to have found that it paid him to keep his men together, and to feed them liberally, since he was thus able to get an increased amount of labour, which made the cost of feeding a remunerative investment. Even with the injudicious marketing of the labouring classes in this country, energy in food costs only about 2d. per 1,000 Calories. The wages of an ordinary labourer consuming food to yield 3,000 Calories is about 21s. a week, or 3s. a day. He is thus paid at the rate of 1s. per 1,000 Calories, a very handsome return for the cost of feeding.

In dealing with our urban populations the possibilities in this direction are, however, probably limited by the bad condition of the teeth and the digestive organs.

Athletic Training.—The objects here are the same as in the case of labourers. The amount of energy which has to be evolved for short periods is frequently enormous, but in the athlete the intervals between spells of activity are generally sufficient to allow of complete recuperation of the muscular mechanism, while in the labourer, although the energy evolved may be smaller per unit of time, taken over weeks and months, it is much greater, and probably requires a larger supply of energy from day to day.

The recognition of the relative parts played by proteids, fats, and carbohydrates in muscular metabolism has revolutionised the diet prescribed in athletic training. Formerly, under the influence of Liebig's teaching that the oxidation of proteids is the sole source of muscular energy, the diet of training consisted very largely of flesh. Now that the limitation in the power of using proteids is understood, and the value of carbohydrates and fats as sources of energy is recognised, a training diet contains an abundance of these constituents.

As examples of the diet of athletes the following from Atwater and Bryant's *Dietary Studies of University Boat Crews* may be given :—

----	Proteid.	Fat.	Carbo-hydrates.	Energy Value.
Dietary Studies of University Boat Crews.	Grams.	Grams.	Grams.	Calories.
Harvard University crew at Cambridge	162	175	449	4,130
Harvard Freshman crew at Cambridge	153	223	468	4,620
Yale University crew at New Haven -	145	170	375	3,705
Harvard University crew at Gales Ferry.	160	170	448	4,075
Harvard Freshman crew at Gales Ferry	135	152	416	3,675
Yale University crew at Gales Ferry -	171	171	434	4,070
Captain of Harvard Freshman crew -	155	181	487	4,315
Average - - -	155	177	440	4,085
Summarised Results of other Dietary Studies.				
Football team, college students, Connecticut.	181	292	557	5,740
Football team, college students, California.	270	416	710	7,885
Professional athlete, Sandow - -	244	151	502	4,460
Professional athletes (Helsingfors) :—				
*L. - - - - - -	217·9	259·5	431·0	5,070
*A. - - - - - -	182·2	204·6	392·3	4,254

* Lavonius, *Skand. Arch. f. Phys.*, Bd. 17, p. 196, 1905.

Training not only causes a building up of the energy-liberating tissue, the muscle, but it also leads to the muscle working more economically, to its giving a better return of the energy as mechanical work. This was first clearly shown by Zuntz, and is well illustrated by comparison between the expenditure of energy by an untrained town dweller and an Alpine carrier in climbing. While the former, according to Hueppe's figures, in a six-hours' climb expended 449 Calories in mechanical work and 1,000 Calories in heat, the latter in a climb of ten or twelve hours, expended 884 Calories in external work and only 565 as heat !

Sedentary Life.—For those engaged in business and in the professions, and for those not engaged in heavy manual work,

or in athletic training, the rule should be to take just the amount of food which is required to supply the energy expended, and to avoid throwing extra work upon the organs of digestion and excretion by eschewing an excessive consumption of proteid. It is to members of these classes that the work of Chittenden most aptly applies. He has clearly proved that not only University teachers, but also soldiers and student athletes can live in sound health on an intake of only 50 grms. of proteid per diem, and an energy intake of under 3,000 Calories.

B. *Females.*—For women who are not child-bearers, the dietary requirements are regulated by the same conditions as those formulated for men. But for child-bearers the necessity of an ample supply of nourishment must be recognised if the children are to be born into the world in the most favourable condition to resist the adverse surroundings of early childhood.

The influence of the diet of the mother on the size of the progeny was studied by me in guinea-pigs, and it was found that mothers, who were kept upon a restricted diet during the later months of pregnancy, threw litters which were 31 per cent. lighter than those born of well-fed mothers.

Prochownick claims to have proved that the same applies to women, and he actually attempts to control the size of the child in cases of narrow pelvis by regulating the diet of the mother.

VI.—THE SOURCES OF THE PROXIMATE PRINCIPLES OF THE FOOD.

In most races the proximate principles are derived partly from the animal and partly from the vegetable kingdoms. But while some races derive them almost entirely from the former, *e.g.*, the Esquimaux, others, as the poor classes in Japan, depend mainly upon the latter.

Animal Foods.—*Milk*, the early food of all mammals, contains an admixture of proteids, fats and carbohydrates in varying proportion in different animals. Human milk is very poor in proteid and very rich in sugar, while in the dog the proteid is abundant and the sugar small in amount. Cow's milk occupies an intermediate position, containing about 3 per cent. of proteid, 3·5 per cent. of fat, and 4·5 per cent. of sugar.

Cream and *butter* consist chiefly of milk fats.

Cheese is composed of the proteid of milk with an amount of fat which differs in different cheeses. The proteids amount to 25 or 30 per cent.

The *flesh* of animals consists chiefly of proteid, ordinary lean beef containing about 20 per cent. But in some animals, either naturally, or as the result of special feeding, the fats may be enormously increased, and may in the case of fat bacon constitute 80 per cent.

Eggs are a mixture of proteids and fats, and contain roughly 10 per cent. of each.

The animal foods are thus generally rich in proteids and fats, while carbohydrates are practically absent except in milk.

Vegetable Foods.—These differ essentially from animal foods in the fact that the nutritive ingredients are contained in the cells in a capsule of cellulose—an inert substance not acted upon by the digestive juices and thus retarding their action upon the cell contents. Again, in many vegetables, a considerable part of the nitrogen is not in the form of proteids, and is probably not available as a foodstuff.

The *cereals* are chiefly used as flours and meals, and the most generally consumed, wheaten flour, contains about 10 per cent. of proteid, and 75 per cent. of starch, while the fats amount to only about 1 per cent. White bread made from this contains only about 7 per cent. of proteids and 55 per cent. of carbohydrates. Oatmeal contains no less than 15 per cent. of proteid and 65 per cent. of starch with about 6 per cent. of fats.

The seeds of *leguminous plants* are specially rich in proteids and some contain a considerable quantity of fat. Dried peas and beans contain about 20 per cent. of proteids and 50 per cent. of starch. The dried soy bean, so much used in Japan, contains no less than 34 per cent. of proteids, 17 per cent. of fats, and 33 to 34 per cent. of carbohydrates, while pea-nuts, with 26 per cent. of proteids and 24 per cent. of carbohydrates, have no less than 38 to 39 per cent. of fats.

Rice, which forms the staple of the diet of many Eastern races, contains only about 6 per cent. of proteid and about 72 per cent. of carbohydrates.

The *bulbous plants* with tuberous underground stems, such as the potato and turnip, and the green vegetables, such as the cabbage, are very rich in water and very poor in nutritive constituents.

The *fruits*, too, are poor in nutritive constituents, and are generally of little value as foods. The banana, however, since it contains between 22 and 23 per cent. of soluble carbohydrates, must be regarded as a food of some value. Dried fruits, such as dates, raisins and figs, contain a quite appreciable amount of proteid—as much as 5·5 per cent. in the fig—and over 60 per cent. of carbohydrates. They are thus foods of considerable nutritive value.

Vegetable foods are therefore *the* great source of the carbohydrates of the diet and many of them also contain an abundance of proteids. Generally they are poor in fats—although the pea-nut and the olive contain these in abundance.

These vegetable foods also generally contain the soda and potash salts of such organic acids as citric, malic and tartaric acids. These in the body are oxidised to carbonic acid which, linked with the base, helps to maintain the alkaline reaction of the blood and to reduce the acidity of the urine.

THE RELATIVE ADVANTAGES AND DISADVANTAGES OF A PURELY ANIMAL, A PURELY VEGETABLE, OR A MIXED DIET.

It may at once be said that any of the three diets is possible. In all three a sufficient amount of proteid may be obtained, while the excess of energy required may, on a purely animal diet, be procured from fats, and on a purely vegetable diet mainly from carbohydrates.

The Esquimaux can get the necessary 3,000 Calories of energy from 200 grms. of proteids and 300 grms. of fats from 2 or 3 lbs. of the very fat tissues of the bodies of the animals he captures. Among civilised people such a diet would probably prove indigestible and would certainly be costly.

In considering whether a purely VEGETARIAN DIET is possible, it is necessary to consider whether vegetable proteids can replace animal proteids as muscle builders. This question

has been answered in the affirmative by quite conclusive experiments. The vegetable fats are also of equal value with animal fats as sources of energy, while, as stated above, vegetables are the sole source of carbohydrates.

Pure vegetarianism is therefore theoretically perfectly possible, and that it is also practically possible is shown by the experience of many individuals and by several careful scientific observations. That many of the vegetarian diets studied have been found to be eminently unsatisfactory is no more an argument against vegetarianism than the fact that faulty mixed diet exists is an argument against a mixed dietary.

A study of these faulty vegetarian diets serves to show some of the difficulties the vegetarian has to contend with.

These are :—

1st. The low proteid value of many vegetables.

2nd. The excessively high carbohydrate value.

3rd. The inclusion of the nutritive constituents in the cellulose envelope of the cells, by which—

(*a*) These constituents are protected from the action of the digestive juices, and

(*b*) The bulk of inert and useless material in the diet is increased.

These difficulties may be best indicated by reference in detail to some examples of vegetarian diets.

Two illustrations of vegetarianism in its most absurd form may first be given. Dr. Dunlop and I had the good fortune to be asked to make a metabolic study on an individual who held that health and vigour could be maintained on a diet of bananas. During five days, while under observation, he existed upon 9½ lbs. of bananas. The daily intake was :—

Proteids	7·5 grms.
Fats	0·7 „
Carbohydrates	199·8 „
Calories of energy	856

At the beginning of the experiment he weighed only 52 kilos., although 5 ft. 10½ in. in height—only 40 per cent. of the normal weight for his height—and at the end of the observation he had lost 2 kilos.

AVERAGE DAILY NITROGEN BALANCE IN GRMS.

Intake :—		*Output :—*	
Food	1·21	Urine	3·23
		Fæces	1·14
			4·37

In fact, he was daily losing 19·75 grms. of proteid from his tissues.

Caspari records a much more prolonged observation upon a man who limited himself entirely to a diet of grapes for a period of 41 days, taking about 1 kilo. of grapes per diem with an occasional apple.

The energy value of the diet and of the excreta was directly determined, and after deducting the energy value of urine and fæces from the energy value of the food, only 571 Calories per diem were left available. It is not surprising that he had lost no less than 8·2 kilos. of weight at the end of the period. His intake of nitrogen was only 1·18 grms. per diem, and actually more was excreted in the fæces.

During the next 21 days apples were substituted for grapes, about a kilo being eaten daily, and the weight decreased from 44·6 kilos to 40·7 kilos. No less than 65 per cent. of the nitrogen of the food appeared in the fæces, and 12·25 per cent of the energy, so that 66 per cent. of the energy used came from the man's own tissues.

In a third period of 14 days, figs and oranges were added to the diet, and the loss of weight amounted to only half a kilo.

In these two sets of observations, the subjects were practically in a condition of starvation and were living on their own tissues. In Caspari's case the individual had lost so much weight, that at the end of the third period he was able to maintain his weight by the absorption of 2·5 grms. nitrogen and 1,383 Calories of energy per diem. The photograph given in Caspari's paper shows a living skeleton, and the chief purpose of such observations is to serve as a warning to those who are so foolish as to imagine that without knowledge they can devise a satisfactory diet for themselves.

Some more reasonable vegetarian diets may next be considered.

One of the best known studies of such a diet is that recorded by Voit, on a working man of 28 years of age and 57 kilos weight, who had lived for three years on a purely vegetarian diet of bread, apples, figs, oranges, dates, and oil. The study was divided into three periods, and the mean of these showed an intake of:—

Proteids	54·2 grms.,	of which 47 were pure proteid.
Fats	22·0 „	
Carbohydrates	55·7 „	
Cellulose	16·0 „	

Of this there appeared in the fæces:—

Of proteid	41 per cent.
„ fat	30 „ „
„ carbohydrates	3 „ „

so that the weight was maintained on the absorption of only 4·9 grms. of nitrogen (30·6 grms. proteid) per diem, with 2,679 Calories of energy chiefly derived from the carbohydrates.

Jaffe records an interesting study of a vegetarian household in California. The family consisted of two women and three children, and their diet consisted of nuts, fruit, olive oil, and some honey. The intake, calculated as per man per diem, gave a varying intake of nitrogen of from 36 to 80 grms. per diem, with an energy value of from 1,480 to 2,765 Calories per diem. In an experiment made on the youngest girl, it was found that the absorption of the food constituents was about as good as is generally the case on an ordinary mixed diet, and, although the intake of nitrogen was considerably below 100 grms. per man per diem, the child put on 13·7 grms. of proteids per diem, and appeared healthy and well. Such an observation shows the possibility of maintaining health on a diet of raw vegetable products if these are properly selected. The abundant supply of nuts here yielded the necessary proteid, while olive-oil yielded the fat.

The same satisfactory absorption of the constituents of a vegetarian diet is recorded by Taniguti in his investigations on the dieting of Japanese soldiers fed on rice, to which they were allowed to add any vegetable products they cared to select. The food contained between 10 and 11 grms. of nitrogen, between 62·5 and 68·7 grms. proteids, of

which about 20 per cent. was not absorbed, but the energy value amounted to from 2,770 to 2,790 Calories, an ample amount, considering the small size of the individuals. These results correspond closely with those obtained by Kumagawa, another Jap, in a series of observations upon himself.

As showing that an adequate diet may be obtained from a purely vegetable source, the study made by Rumpff and Schumm on a lad of 19 weighing 63 kilos. may be cited. The investigation lasted eight days, during which time the subject lived on dates, quaker oats, rice, sugar, walnuts, Graham bread, and apples—the oats and rice being cooked, and the apples sometimes cooked.

The diet yielded :—

Proteids	73·88 grms.
Fats	28·64 ,,
Carbohydrates	698·21 ,,
Calories	3,432

Although nearly 34 per cent. of the nitrogen and 26·5 per cent. of the fat were not absorbed, the lad gained 1·7 kilos. in weight.

This diet and Voit's classical study serve well to show the difficulties of a purely vegetarian diet already alluded to :—

1st. The poverty of most vegetables in proteids generally leads to a very excessive use of carbohydrates with the result that intestinal fermentation with accompanying flatulence and sometimes diarrhœa is apt to occur. But there is no real reason why a supply of even 100 grms. of proteids should not be secured in vegetables if leguminous plants, and above all the soy bean of Japan and its products, are freely used. These are richer in proteids than beef and mutton.

2nd. The prejudicial effect of the existence of the cellulose capsule surrounding the nutritive material is shown to lead to a much less perfect absorption of the constituents from vegetables and especially from raw vegetables than from animal foods. But this may be largely overcome :—

(1) By careful preparation of the food. Observations made under the U.S. Board of Agriculture have shown that bread made from flour ground fine by a patent process is much better absorbed than bread made from

ordinary flour. In macaroni and vermicelli, as well as in the Japanese tofue prepared from the soy bean, the proteid is freed from the cellulose capsule and is very completely absorbed.

(2) By careful cooking, so as to secure that the cellulose capsule when present is completely and freely ruptured. The observations of Rockwood show this most clearly.

(3) By careful mastication, for which a thoroughly good set of teeth is essential.

Pure vegetarianism, while quite possible, would thus probably prove to most people in this country of considerably more trouble than the use of a mixed diet. The easier and more rational course from an economic and physiological standpoint is to use both animal and vegetable kingdoms as a source of the proximate principles of the diet. But the consideration of the practical possibility of vegetarianism serves to enforce the very great value of vegetable foods, a fact largely ignored in this country, and more especially by the poorer classes. These classes spend about twice as much of the money they can so ill afford upon animal as upon vegetable foods, and it seems impossible to persuade them that for one penny they can buy four times as much flesh-forming material in oatmeal or pea-flour as they can in beef, while at the same time they get for their money about ten times as much energy for work.

GENERAL CONSIDERATIONS ON THE THERAPEUTIC USES OF DIET.

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There is, perhaps, no more ancient method of healing disease than by the use of dietetic means, but, in spite of this, it can be safely asserted that there is none which we use with a less degree of confidence and precision. And this for several reasons. In the first place, the physiology of dietetics is still very far from being an exact science, and this constantly hampers us in any attempt to lay down exact rules for our guidance for the prescription of diet in cases of disease. In the second place, the "personal factor" is always coming in to upset our calculations. Individuals vary greatly in their reaction to the same regimen, even in health; much more, therefore, may they be expected to do so in disease, whence it results that the prescription of any plan of diet always partakes more or less of the nature of an experiment. Lastly, it must be confessed that the loose way in which dietetic means are employed in treatment, when compared with the comparative exactitude and consistency with which drugs are prescribed, is due in no small measure to the lack of any proper system of instruction in the principles of dietetics in our medical schools.

In the present article of this number an attempt will be made to sketch out very briefly the general uses and limitations of dietetic means in the cure of disease, and to indicate the principles which guide their application, while matters of detail will be left to the consideration of other writers.

At the outset, a broad distinction may be drawn between the use of quantitative and qualitative alterations of diet in treatment. In the one case, we attempt, by increasing or lessening the total "energy value" of the diet (as physiologists call it), to raise or lower the patient's general nutrition; in the other, we seek to modify the chemical composition or

mechanical form of the food, in order to meet some morbid change in metabolism or the impaired function of some particular organ.

In the prescription of an increase or limitation of the diet as a whole, in cases of disease, we are sadly handicapped by the want of agreement amongst students of the laws of nutrition as to what constitutes a normal "standard diet." This aspect of the subject is considered in detail from the physiological point of view in another article, but it may be pointed out here that the latest researches on the matter point to the conclusion that the standards hitherto accepted are needlessly liberal, not only as regards the total energy-value of the food, but more particularly as regards the amount of nitrogenous material (proteid), which it should contain. Hitherto, most of us have supposed that obesity, and perhaps alimentary glycosuria, are the only morbid conditions which can be directly ascribed to the habitual consumption of an excess of the energy yielding, or carbonaceous elements of the diet. But now Dr. Francis Hare comes along with his doctrine of "hyperpyræmia," and insists that any excess of such foods is not necessarily converted into fat, but may circulate in the blood in an imperfectly oxidised form, and be the cause of migraine, asthma, biliousness and gout, to say nothing of insanity and neurasthenia, and several other conditions which we are constantly called upon to treat. On the other hand, Professor Chittenden argues (with greater cogency) that an excessive consumption of proteid is the prevailing fault in ordinary diets, and that this, by throwing a constant strain upon the organs which are concerned in dealing with nitrogenous waste, is a fertile source of disease. To the presence of imperfectly oxidised nitrogenous matters in the blood, too, he traces the development of many diseases, such as gout, chronic rheumatism, migraine, and indeed most of those very conditions which, according to Dr. Hare, are the result of an over use of carbonaceous foods. Between these opposing views it will take prolonged clinical observations to decide—observations, however, to which every practitioner may contribute. Meanwhile, it may be pointed out incidentally that there may not be such real opposition between them as appears on the surface. A reconciliation may perhaps

be found in an application of the doctrine of the "proteid sparers." If carbonaceous foods, and especially carbohydrates, are consumed in excess, the complete oxidation of proteids is interfered with, so it may well be that the consumption of a too carbonaceous diet results in an accumulation in the blood of imperfectly oxidised nitrogenous matters, just as much as if an excess of proteid itself had been taken. Whether, then, a restricted diet all round, or merely temperance in the use of proteid is the ideal to aim at, there can be no doubt that recent work on dietary standards has enlarged our outlook regarding the possible pathological results of overfeeding, and should encourage us to make a bolder use of restricted diet in the treatment of many forms of chronic disease. We certainly need not be so timid as we have been in the past, in trying the effect of cutting down our patients' consumption of proteid (which means in practice the consumption of animal food), in the treatment of such conditions as chronic gout, so called chronic "rheumatism" (which is probably merely another manifestation of the presence of waste nitrogenous matters in the blood), high arterial tension, chronic renal disease, migraine and the paroxysmal neuroses. One caution, however, must be borne in mind. However advantageous a minimal proteid consumption may be in adult life, it is probably not advisable to sail too near the wind in this respect whilst growth is still going on, for the construction of body tissue can only take place when proteid is supplied in abundance. It is noteworthy in this connection that young subjects do not, as a matter of fact, tend to suffer from those diseases which are the expression of an excessive ingestion of nitrogenous food, and I think that every experienced practitioner will agree that more harm is done to children by a too starchy diet than by one which is too rich in animal food. Another caution also may not be out of place. It has long been held by our profession, more or less empirically, I admit, that the habitual consumption of a minimum of proteid exposes the individual to a lowering of vitality, which expresses itself in a greater liability to suffer from infective disease. Now we must not be in too great haste to abandon this doctrine.

The comparative immunity of the Carnivora to tuberculosis, for instance, and the success which has attended a

raw-meat diet ("zomotherapy") in phthisis, should, at least, give us pause. We would be doing our patient an ill service, if, in steering him clear of the Scylla of degenerative disease in later life, we should land him in the Charybdis of some infective process in his early manhood. Time, and more prolonged clinical experiment, will doubtless show us the safe middle way: meanwhile, an attitude of caution is the wisest for the practical physician to adopt. Let us, in a word, beware of too much zeal; let us be temperate, even in enjoining temperance.

When we have to consider the indications for "feeding up" our patients, we are, I think, on surer ground. The guidance afforded by the body weight and the body temperature, can hardly deceive us. Progressive loss of weight, and a habitually subnormal temperature, are pretty sure signs that a more abundant diet is called for. All wasting diseases exhibit the former indication; such conditions as neurasthenia and chorea, the latter, and clinical experience has abundantly shown that a fattening regimen can be pursued with perfect confidence in such circumstances. In adjusting the diet with this object in view, we should avoid lop-sided prescriptions, and aim at increasing all the nutritive constituents of the food, rather than adding to the consumption of any one of them alone. There is no better way of carrying this out in practice than by ordering the patient to drink milk.

Turning now to the therapeutic use which may be made of qualitative alterations in the diet, it will be well to have clearly before our minds the directions in which such treatment is likely to be of service. Change of diet is not a panacea, and in many cases what our patient eats need not trouble us at all. Indeed it may be safely asserted that no change should ever be made in a patient's customary diet, unless we have definite grounds for doing so. Were this rule always observed, we should as a profession escape the charges of inconsistency and arbitrariness, which the public is apt to bring against us, and, it must be admitted, with some justice, when we come to the dietetic part of our plan of treatment. In the first place, then, the diet may require modification either chemically, or, what is even of greater importance, mechanically, in order to meet some disability on the part

of the organs concerned with the digestion and absorption of the food. We do well, therefore, to prescribe a careful regimen in cases of dyspepsia, or intestinal disease, remembering, however, that but few cases of dyspepsia are really *cured* by diet, and that in most instances, all that we can do is to adjust the burden to the powers of the weakened organ, whilst trusting to other means to bring back to the patient the digestive powers of a healthy man. From the organs of absorption the food reaches the blood, and may be made effective in determining chemical alterations in the composition of that all-important fluid. We may insure, for instance, an adequate supply of proteid and organically combined iron in cases of anæmia, and of vegetable salts of potash in scurvy, or we may avoid diluting the blood in dropsy. Passing from the blood, the food reaches the tissues and places its impress on the whole character of the patient's metabolism. It is here that the quantitative changes in diet, referred to above, play their chief part, but we may also seek to modify the direction of metabolism, or to remedy impairment of it, by suitable qualitative alterations in the composition of the food too. Diabetes, acute fevers, and gout are examples of such impairment of general metabolism, which we meet, in the first case, by diminishing, or abolishing, carbohydrate ingestion; in the second case, by increasing the amount of carbohydrates and lessening the intake of proteid and fat; and in the third, by restricting the consumption of foods, which yield an abundance of those chemical ingredients (purins) which exaggerate the production of uric acid. All these are well-known illustrations, the dietetic treatment of which is considered in detail in other articles, but there can be little doubt that as our knowledge of pathological chemistry increases we shall gradually learn to control other vices of metabolism, which express themselves in different forms of disease, with just as great certainty as we now do these. Finally, having passed through the metabolic mill, what is left of the food reaches the organs of excretion, the amount of work thrown upon which can be largely controlled by altering the composition of the diet. The application of this principle in the treatment of renal disease, or of urinary gravel, is a commonplace of therapeutics, the practical technique of which is considered elsewhere. In all these ways,

then, we have it in our power to alleviate or cure disease by varying the composition of the diet.

In conclusion, it may not be out of place to lay down some general rules which should always be borne in mind when drawing up any plan of dietetic treatment :—

1. *When prescribing a diet for a case of local disease, one must take care not to sacrifice the whole to the part.*—The organs are "members one of another," and one must not interfere with a patient's general nutrition in the interests of any one of them. This rule finds its chief application in cases of dyspepsia. It is often better—even in the interest of his stomach—for a dyspeptic to endure a certain amount of discomfort after food rather than to lower his general vitality by too great abstemiousness.

2. *No article of food should be forbidden unless one has a good reason for doing so.*—Observance of this caution will ensure the avoidance of arbitrariness in dietetic prescriptions, and greater consistency in the practice of different physicians.

3. *In acute disease one should recommend; in chronic disease forbid.*

4. *Before recommending any article, find out whether the patient likes it, and whether it agrees with him.*

5. *If an article disagrees, it is generally better to reduce its amount in the diet than to cut it off altogether.*

6. *General and proposed changes of diet should be made gradually.*

7. *Always bear in mind the following aphorisms of three great physicians :—*

"Such food as is most grateful, though not so wholesome, is to be preferred to that which is better though distasteful." (Hippocrates.)

"More importance is to be attached to the desires and feelings of the patient than to doubtful and fallacious rules of medical art." (Sydenham.)

"Physicians appear to be too strict and particular in their rules of diet and regimen; too anxious attention to those rules hath often hurt those who were well, and added unnecessarily to the distress of the sick." (Heberden.)

THE EFFECT OF DIET ON CHRONIC HEART DISEASE AND DISEASES OF THE CIRCULATORY SYSTEM.

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THE more careful study of dietetics in recent years has led to many changes in medical practice. The chemist, the physiologist, and the physician have all been concerned in this study, and the observations of each have been necessary in order to place the matter upon a sound basis, and to establish certain principles which can no longer be disregarded by practitioners. Many and varied, indeed, have been the views held respecting both methods and details as to appropriate dietetic treatment of the several ailments of the body, some wise, and many more unwise. It may, however, be affirmed that we are now in possession of knowledge, which has been acquired by scientific methods, and approved by that best and rarest of qualities—common sense. In this article I am only concerned to discuss the effects of diet in cases of chronic heart disease and diseases of the circulatory system. We may note first, that several forms of heart disease may long exist without giving manifest tokens of their presence. In the earlier stages they may not discover themselves, and be only detectable when sought for. This is especially the case in some forms of mitral valvular disease, which are adequately compensated, the too common results of rheumatic endocarditis, a condition so often ineffectually and imperfectly treated at its onset, and for many subsequent weeks. (It can hardly be doubted that, if such patients were kept at rest in bed for two months after an attack of rheumatic fever, there would be many fewer cases of heart disease in later life.) The same may fairly be declared in respect of damage to the aortic valves, although the conditions here are naturally graver. The cardiac symptoms, declaring these valvular faults, are well known to

depend on failure of compensation, caused by weakness and decay of the myocardium. At this point, treatment, dietetic and medicinal, is called for. The integrity of the myocardium depends on several factors. The most important is the personal factor, relating to the constitution and nutritional powers of the individual, and the next has to do with the manner of life, habits, and occupation of the patient. For the most part, it must be allowed that, from this point, we are generally concerned in playing a losing game, being able to do little more than procure a temporary alleviation of symptoms, unless we can secure a complete change in the patient's mode of life, and have a fairly robust constitution to deal with.

In cases of valvular defect, which are compensated by kindly efforts of nature in the form of simple hypertrophy, the object to be sought, in respect of dietetics, is to promote and encourage this process by maintaining a wholesome and effective nutrition of the whole body. Plain food of all varieties, plainly cooked, taken in regular meals, without any overloading, or excess in solids or liquids, is to be enjoined. Gastric, or intestinal, dyspepsia is naturally inconsistent with favourable nutrition of the body generally, and of the myocardium in particular. In the young, so long as sufficient food is taken, there is no need to encourage excess, or to feed habitually between meals. Strong meat soups and essences are to be avoided, and tea sparingly taken by both young and older patients. As a rule, all alcoholic drinks are best omitted from the diet, and tobacco-smoking is to be abjured, or very slightly indulged in, and then only after a meal. If tea or tobacco induces palpitation, neither must be used.

If these measures are imperative in the case of simple myohypertrophy of the heart, they are even more so when failure of muscular efficiency shows itself by the well recognised symptoms of dyspnœa, palpitation, and oppression in the chest.

If, as a result of this failure, there is dropsy, the diet has to be modified. Some degree of cardiac hypertrophy and a greater one of dilatation are certain to be present. The urine is commonly albuminous, scanty, and loaded. The liver is tumid and engorged. The question of fluid food has to be considered,

for distension of the stomach and a plethora of even diluted blood are mischievous factors in such a case. It is necessary to feed such patients with small meals, and to limit the amount of fluids of all kinds. The greatest relief is thus often afforded, liquids being taken chiefly between meals. It is also desirable to make the principal meal soon after midday, and to enjoin a lighter one in the evening; to avoid giving, at any one time together, proteids and carbohydrates. These are better given apart, so far as possible.

The choice of food is hardly important so long as it is simply prepared and readily digestible. Pre-digested food is not so necessary as is commonly believed, but it may be needed in some cases. Soups and draughts of milk are, therefore, unwisely recommended in most instances, as tending to flatulence and discomfort in bedridden, or sedentary conditions. Coffee with an equal part of milk, is often a good cardiac stimulant, and may be better digested than tea as commonly made. A small cupful of freshly-made China tea, with cream, may be given in the morning, and as much cocoa with milk later in the day. Small draughts of water, or unaërated, indifferent, spa water, or freshly made Imperial drink may be given between meals.

The question as to alcohol is here, as in all cases of disease, one requiring clinical skill for its employment, quite as much as in the prescription of any particular drug, and it must be administered, or withheld, without any bias on the part of the practitioner as to the necessity, or desirability, of alcoholic habits for the human race. There are certainly differences of opinion on the advisability of employing alcohol in chronic heart disease. The best clinical experience affords no definite rule for all cases, and it remains, therefore, as I have stated, a matter for prescription *pro re natâ*. The late Dr. Peacock, of St. Thomas' Hospital, whose experience in cardiac diseases was very large, and who was a most cautious and level-headed physician, declared that he knew of no form of heart disease in which some form of alcohol might not be used. Much depends upon the previous habits and the condition of the digestion of the patient. It may be affirmed that, in some cases, a little brandy, or whisky, or gin is of distinct benefit, best given with a meal. The amount seldom need exceed two

or three ounces *per diem*, given in divided doses. It is found of more value in cases of aortic disease, in the later stages, where there is free regurgitation, and is usefully given at bedtime in such cases. The fact that the long and improper use of alcohol is well known to induce arterial sclerosis, and varied forms of heart disease, has not to be considered at the bedside of patients where this mischief has been accomplished, and we are in face of the malign and final outcome of these evil habits. Our business is to treat the patient and not his disease ; and if alcohol can help at all, as we have good reason to believe it can, we are bound to make use of it. That is the clinical lesson, apart from any teachings or doctrines derived from other sources respecting the employment of alcohol in the abstract.

In the later stages of progressive heart-failure with tumidity of the liver and dropsy, we encounter greater difficulties in respect of the dietary. The engorged portal system induces a condition of gastric catarrh, with aversion from almost all food. Medicinal means, which we may not discuss now,[1] come in here largely to our aid. Predigested foods may be employed at this stage, milk and barley water with citrate of soda, and Koumiss (No. 2) may prove sufficient nutriment till some measure of appetite returns. Any efforts to force stronger food on the patient are futile and mischievous. Small quantities of iced champagne may prove useful. The question of withholding all salt from the food is worthy of consideration so soon as dropsical symptoms appear, and this plan may be tried.

The diet in cases of aneurysm must next be considered. It is seldom, I suppose, that Tufnell's plan is now rigidly carried out, but a modification of it is the ordinary practice. The principle is to reduce the intake of all food, solid and liquid. The amount must naturally vary according to the peculiarity of the individual, care being taken not to be too rigid in any case where there is, in addition to the aneurysm, a condition of aortic reflux. Such cases are unfit for Tufnell's treatment, and a little wine should form part of the diet for most patients, that of Bordeaux being probably the best. Milk would appear to be an appropriate liquid to employ, as tending

[1] In particular, active leeching over the epigastrium.

to aid in the desired coagulability of the blood. It is to be borne in mind that a greatly restricted diet is only compatible with absolute recumbency, and cannot be prescribed for patients who are not so confined. Experience, unfortunately, does not give us much hope for the majority of cases of thoracic, or abdominal, aortic aneurysms even when thus treated, but it is certain that no better plan is known, and it is incumbent on us to enjoin the above-mentioned method, together with appropriate medication.

In cases of widespread arteritis, with high arterial tension, much benefit is derivable from a diet deficient in proteid, animal food being thus reduced so far as possible. An increase of diluents is also important, especially between meals. Vegetable and carbohydrate food, with fish, must be the mainstay in these cases. Even here, care has to be taken to ensure an adeqate nutrition of the patient, regarding his general well-being and mental state. In medicine, we may never carry out any *doctrinaire* principle, however desirable it may be theoretically, if, in practice, it is found not to agree well with the patient.

In the conditions of the blood, which lead to clotting, and so inducing thrombosis in veins, or arteries, we may readily combat the hyperinosis by a vegetable and diluent dietary, and by avoiding the use of milk in any but small amount. The richness of milk in lime salts renders abstention from it somewhat imperative. Hard waters are likewise to be avoided in these cases. Lemon juice is of particular value in hyperinotic states.

ON THE DIET IN ACUTE ILLNESS.

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FROM the time of Hippocrates onwards, it had always been the custom in acute illnesses to put patients on very low diet, and, in many cases, to practically starve them. While this, to a certain extent, was beneficial for the first day or so, undoubtedly many lives were lost through not giving sufficient food in the longer illnesses, and Graves in 1843 clearly demonstrated that one great danger of fever lay in inanition, and that the prognosis, in a great many cases, was enormously improved by giving the patients a nutritious diet. Careful observations in the seventies showed that in acute illness meat, cheese and eggs were not thoroughly absorbed, while carbohydrates and jellies could readily be assimilated.

When it was first proved that the heat of the body was kept up by the combustion of the food which was taken, it was concluded that fever in a similar way was kept up by feeding, and that, therefore, when a patient had fever he ought to be starved. This is now known to be an error. One of the first questions we have to consider is: In what way does a patient with fever differ from a normal one? The rise of temperature is due to poisoning of the heat-regulating mechanism, and, although there is an abnormal disintegration of tissues, the main cause is the defective loss of heat. In considering the influence of food in fever, we must pay attention not only to its effects on the temperature, but also on all the symptoms which are induced by the respective organisms in the fevers in question. In fever, the blood pressure falls, the heart's action becomes more feeble, the receptivity of the patient is dulled, and, in extreme cases, there is delirium, or coma, the saliva and gastric juices are altered, the mouth becomes dry, there is loss of appetite with distaste for food, there is an excessive metabolism in the nitrogenous, and also, to a less extent, in the non-nitrogenous elements. It is convenient to classify fevers into slight, and severe, into short,

and persistent, and, in any case, in deciding whether a fever is severe or not, quite as much attention must be directed to the state of the tongue and the general condition of the patient, as to the temperature. It will be found that some patients with a slightly raised temperature may yet be so toxic as to be unable to assimilate much food, while others, with a high temperature, may yet retain a fair appetite. It is also found that, when fever persists as in phthisis or pyæmia, the glands and secretions may become so accustomed to the abnormal condition that considerable amounts of food may be administered with advantage.

Let us consider the various ways in which nourishment may affect the symptoms. It may act by neutralising, or counteracting the poison, either by supplying anti-bodies, or by altering the alkalinity of the tissues. This is well shown in scurvy, anthrax, &c. Secondly, it may act as a stimulant on the heart and nervous system, including the pulse and the temperature, as alcohol does. It is now known that antitoxins are produced by the cells, and that their capacity to do so efficiently largely depends on the nutriment with which they are supplied. The elimination of poisons can be greatly accelerated by giving large quantities of liquid, so that the poisons are diluted while the cutaneous and renal organs are stimulated to activity.

1. One of the most striking phenomena in favour of administering abundant liquid is the retention of water and of sodium chloride which takes place in fever, and hence too much stress cannot be laid on the importance of an additional supply of liquid.

2. *As an Antipyretic.*—We no longer believe that starvation is an efficient way of lowering the temperature, but cold drinks and also getting the skin to act by increasing the perspiration are of value.

3. *As a Stimulant.*—The value of tea, coffee, and alcohol in conditions of collapse and cardiac failure is generally allowed. The administration of sugar also is an extremely valuable means of reviving fatigued muscles.

4 *On the Kidneys.*—A large quantity of liquid will increase the action of the kidneys, and help the excretion of poison,

but care has also to be taken that the food is of such a nature that the waste products of digestion throw as small a strain as possible on the already over-worked and damaged excretory organs.

5. *On Digestion.*—In fever, the mouth and lips become parched, and the tongue dry owing to the defective secretion of saliva, and, as a consequence, patients in a state of fever are unable to chew, nor do they move their tongues about sufficiently : hence bacteria flourish and the mouth becomes a centre of infection. Stomatitis and parotitis may develop. Thirst, which is always a marked feature in fever, is due partly to the dry condition of the mouth, but also to the increased specific gravity of the blood, which results from the tissues of the body having attracted increased quantities of fluid out of the blood on account of their poisoned condition, and also on account of the sodium chloride retention. The diet of fever should, therefore, consist of liquids and not of solids. There is also marked loss of appetite with anorexia, which is due partly to the poisoning of the nervous system, and partly to the imperfect digestion. It has been proved that, in fever, the movement of the stomach is greatly reduced so that food is retained in it longer, and, in many cases, also the secretion of digestive juice and hydrochloric acid is deficient. From these combined causes, food ferments much more readily, hence peptones and albumoses should be assimilated much more readily than meat. The administration of acid is indicated to supply the deficient secretion, and also to check bacterial fermentation.

Bowel.—It is, however, found by observation that, in fever, the absorption of food in the bowel is almost as efficient as in health ; some 90 per cent. of the fat and albumen being absorbed ; but carbohydrates have been found in the fæces, if given in excess, or when there is much diarrhœa.

6. *Influence on Metabolism.*—What is the quantity of food which is necessary for a patient in fever ? In health 3,000 calories are required for an active man ; this may be supplied by 100 grammes of albumen, 100 of fat, and 400 of carbohydrates. In fever, the excretion of nitrogen is greatly increased as the poison disintegrates the cell tissue, and

interferes with the capacity of the cells for building up albumen. The CO_2 excretion is only increased by 20 per cent., or less. For a patient in bed, 2,400 C. should theoretically be required, if there is pyrexia 2,700 C. With chronic pyrexia, it has been found that 1,500 C. may be sufficient, and practically the diet of a patient with acute illness will more often be found to have a value under, instead of over 2,000 C.

The next question is:—Will giving a patient an excess of nitrogen in his diet put a stop to the tissue loss? It has been shown by experiment that to some extent this may be answered in the affirmative, for a great increase in the amount of nitrogen in the diet, will increase the amount of nitrogen excreted, and the amount absorbed may be slightly increased by this means; but the general fact remains that it is impossible to prevent, by any diet, the waste of tissue in fever. Nor has it been found that it can be prevented by anti-pyretics, since, even if the temperature becomes normal, the effect of the poison on the tissue persists.

Metabolism in Convalescence.—After the temperature has fallen to normal, the excessive nitrogenous excretion will often reach its maximum, and it is not until some days later that nitrogenous equilibrium is again reached. Hence the rule, that fever diet should be kept up for some three or four days after the temperature has fallen to normal, as it is not until then that the cells are equal to assimilating nitrogen properly.

Metabolism in Chronic Fever.—The body gradually becomes accustomed to the condition of pyrexia, and may assimilate as much nourishment as or more than it can in health. This is well shown in phthisis.

From the indications already laid down it is clear that the diet of fever should be a fluid one, containing nourishment in an easily assimilable form, and, for this purpose, milk is the most useful. It can be supplemented with broths, and the nutritive value increased by the addition of various carbohydrates.

The fluid is grateful to the thirsty patient, the taste inoffensive, and the waste products non-irritating to the excretory organs.

The milk can be diluted with either lime or barley water, and given in divided doses according to definite directions.

At the onset of an acute illness, if the digestion is much upset, it is wise for the first day or so to limit the amount to a pint, and to quench the thirst with water, barley water, or light broth, which may be administered frequently, and the mouth should be kept moist and scrupulously clean with a mouth wash.

After the first day, in order to provide a diet of sufficient caloric value, the amount should be increased to two and a half pints, and up to four if the patient can digest the larger amount. This should be given in divided doses of 3–10 ounces every two hours or so while awake. The patient may take in addition, with toast, chicken or veal broth, or beef tea, and this may be thickened later on by the addition of some cereal, or somatose, or Plasmon. As more nourishment is required the milk can have added to it Mellin's or Benger's food, arrowroot, grits, or cornflour Another very useful addition and one not sufficiently used, is milk sugar, which is not too sweet, and one or two teaspoonfuls can be added to a cup of milk. Three pints of milk only supplied a diet of 1,200 calories, and the further needs of the body must be supplied by the additions indicated.

When the digestion is so far upset that there is vomiting or diarrhœa, and undigested masses of curd are found in the motions, milk can be more diluted, and the quantity reduced, or a grain of citrate of soda added to each ounce, which makes the curd much more flocculent, or the milk may be peptonised with Fairchild's powders. Should these methods fail, the milk may be temporarily replaced by broths, whey, or albumen water. In order to spare tissue waste, we may administer gelatine, carbohydrates, or fats. Of these the carbohydrates are the most useful.

Broths contain, practically, no nourishment, and are of value chiefly as stimulators of appetite, and as a vehicle for other foods ; but, if some of the meat fibre be pounded up, rubbed through a sieve, and added, their value is greatly increased. Jellies are refreshing, and those flavoured with juice fruit contain a considerable amount of sugar, which is of value.

Fat in the form of cream may be added to milk, as the digestion improves, to the amount of four or five ounces a day.

As the patient's condition improves, eggs beaten up with milk, with the addition of wine should it be indicated, lightly boiled eggs, custard and blanc-mange made with gelatine, may be given, and various forms of light milk puddings. During convalescence, oysters, sweetbread, tripe, lightly cooked white fish, chicken, and game gradually lead up to the ordinary diet.

It is most essential, in acute illness, to see that the stomach is not overladen with a quantity of undigested food; this is frequently the case in acute pneumonia, and also with severe bronchitis in the old, and is a not infrequent cause of death. Thirst is often considerable, and should be quenched with water, barley water, rice water, toast water, or beverages flavoured with lemon, or other fruit juices. Not infrequently Imperial drink, which acts on the kidneys and bowels, is indicated. In most cases there is no objection to a cup of tea or coffee, which will be found very refreshing.

On the Use of Alcohol in Acute Illness.—Alcohol is not required at the onset of acute illness, and at that time its use is more injurious than beneficial. Its use comes in when a crisis has to be tided over, in prolonged illnesses and during convalescence, and in improving the appetite, and assisting in the assimilation of other food. There is no question that alcohol is a food, and one which is readily assimilated. It is a carbohydrate- and fat- but not an albumen-sparer. At the same time, if given in any considerable quantity, its toxic effect more than counterbalances these uses.

The conditions, in acute illness, under which alcohol should be administered, are:—

1. Failing circulation, indicated by a rapid, feeble, dicrotic, or irregular pulse, and a feeble first heart sound, whether this has come on suddenly or gradually.
2. In feeble, exhausted, especially alcoholic subjects, also in the aged, or the very young.
3. Inability to take food, from failure of digestion, with a dry tongue, especially if persistent.
4. Persistent pyæmic conditions with high temperature.

5. A condition of low muttering delirium with profound exhaustion and insomnia.
6. During convalescence from an acute illness, while the appetite is still capricious. As a stimulant, the alcohol should not be diluted too much, but given in a small amount of water or food; as an appetiser, it should be well diluted. For hospital patients, diluted simple alcohol is superior to an inferior quality spirits, or wine. When patients can afford old well-matured spirits, or wines rich in ethers, they are undoubtedly superior.

Alcohol in the effervescing form, as champagne, is often most valuable when the appetite has failed in prolonged illness, or during convalescence.

During convalescence from a prolonged illness of severe type, and especially in children, nothing is equal to a very fine old sherry.

The amount of alcohol, which must be given in divided doses, may be from 2 ozs. of spirits upwards, rarely is it necessary to give so much as 6 ozs. in the 24 hours. Almost the only conditions in which this amount may be greatly exceeded with advantage are when there is pericarditis, pleurisy, pneumonia, and endocarditis from rheumatism, all combined at the same time, and in a few cases of very severe pyæmia.

When alcohol is acting beneficially, the tongue becomes moister, the pulse and respiration will quiet down and become more efficient, while the patient's mental condition and appearance will show marked improvement.

When too much is being administered, the tongue becomes dry, the patient duller and heavier, and there is a smell of alcohol in his breath.

The amount that may produce this result depends on the patient's previous history and habits quite as much as on the amount taken, or on the nature of the disease.

DIET IN RENAL DISEASE.

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In renal disease the eliminating functions of the kidney are impaired to very varying degrees in the different affections of these organs, and the principles governing the dieting of these cases must be based on these facts. In some diseases the excretion of nitrogenous extractives is greatly diminished, in others the excretion of salts; in some the flow of urinary water is diminished, in others it is increased. A rigid system of dieting is suitable neither for all kidney diseases nor for all stages of the same disease, and attention in determining the diet should not be directed exclusively to the condition of the urine, but other factors, such as the general nutrition of the patient, the presence or absence of dropsy, the degree of cardio-vascular degeneration present, and the presence or absence of uræmia, are all factors that should be taken into consideration.

In acute renal disease, and in chronic renal diseases where such complications as dropsy in a marked degree and uræmic symptoms are present, the dietetic treatment must be based on restricting the work of the kidney to as great an extent as possible, and this principle may be carried further in the case of acute disease than in chronic, owing to the comparatively short duration of the former.

In cases of true acute nephritis associated with considerable suppression of urine, and where the eliminating functions of the kidney are most seriously compromised, the diet should be reduced to the greatest extent possible, and in some cases of very acute nephritis it may be advisable to withhold all food for a few days. This course is only practicable in the most acute forms of nephritis accompanied with partial or complete suppression. In such instances only water in small quantities should be allowed for 24 to 48 hours. In most cases of acute nephritis such starvation treatment is not necessary, but it is still essential to give as little food as

possible, and it may be as well to restrict this to one or one and a half pints of milk, moderately diluted, in the 24 hours. It is obvious that such a low diet as this cannot be persisted in for any length of time, but it is very suitable at the onset and during the height of the acute nephritis. No other food than milk is required, at any rate at first, and all meat extracts and soups should be avoided throughout the illness, as their nutritive value is low, and they contain numerous extractives and salts which can only act as irritants to the kidney. The amount of fluid given to these patients should also be strictly limited, especially if there is any tendency to dropsy or to the development of hydræmic plethora, and the use of diluents as diuretics should be restricted to the later stage of the malady, where, no doubt, much good may be derived by the administration of moderate quantities of fluid in order to promote the removal of débris from the renal tubules. Harm may be done by the indiscriminate giving of large quantities of fluid during the acute stage of the malady, owing to the inefficient elimination of water and the associated development of hydræmic plethora.

In chronic renal disease, if complications such as uræmia and dropsy are present, the dietetic treatment must be somewhat similar to that applicable to cases of acute nephritis, but owing to the long continued character of the disease, restrictions cannot be carried to the same length as those suitable to the treatment of the acute malady.

In both cases, where uræmic symptoms or anasarca are present, the nitrogenous foodstuffs must be diminished as much as possible, bearing in mind that a considerable portion of the nitrogenous extractives in the urine are derived directly from the tissues, and also that a considerable amount of proteid passes out in the urine in the form of albumin, and is, therefore, lost to the economy. Hence it is not advisable to restrict the nitrogenous input to the extent that is right and proper in cases of acute nephritis. Where dropsy is present, and especially where it is increasing, fluids should be given in strict moderation, and there would seem to be an increasing amount of evidence in favour of limiting, so far as is possible, the quantity of common salt in the food. Where uræmic symptoms are at all marked, either a pure milk diet or

milk thickened with some carbohydrate material, cornflour, arrowroot, &c., or porridge is advisable, and the quantity of milk administered should vary from one to three pints per diem, according to the severity of the symptoms present. It is often advisable not only to give the food in small quantities, but also to pancreatise it so that its stay in the stomach may be short owing to the frequency of vomiting in uræmia. In cases of acute uræmia, the quantities administered must necessarily be small and nearer the limit of one pint than three.

In chronic renal disease associated with dropsy, and particularly with increasing dropsy, a milk diet is also advisable; but in very chronic cases, where the dropsy is moderate in amount and persistent for weeks or for months, it is neither necessary nor advisable to restrict the patient to a pure milk diet for prolonged periods. Such cases may be put on a milk diet of some three pints per diem, and if improvement sets in, such a diet may be continued for three weeks, but it is probable that no useful purpose is served by maintaining such a diet for months, and a more solid diet with a minimum of common salt may often produce more beneficial results.

The improvement under a milk diet in chronic renal disease is often more spurious than real, the quantity of urine is seen to be increased, and the albuminuria to be apparently diminished; these are looked upon as signs of improvement, when really all that has happened is that the diuretic action of the milk has led to an increase in the flow of urine, and thus the loss of albumin, although really the same, has undergone a percentage reduction. Attention should never be directed solely to the state of the urine, the general appearance of the patient and the body weight should be carefully observed. An increase in dropsy frequently shows itself by a rapid increase in the body weight. Although the milk diet may be suitable for cases of chronic disease in which uræmic symptoms are present, and also for some cases where dropsy is present, and especially where it is increasing, such a diet is certainly not to be recommended as a routine measure for long continued periods in chronic renal disease.

For the purposes of treatment, cases of chronic renal disease may be divided up into, first, chronic Bright's disease, where,

whether the urine be scanty or abundant, whether dropsy be present or absent, the urine, at any rate, contains a considerable quantity of albumin; secondly, cases of granular kidney; thirdly, amyloid kidney, which is now far less common than formerly; and fourthly, cases of syphilitic nephritis. In syphilitic nephritis the albuminuria is very intense, the urine not infrequently solidifying on boiling. Such cases are often liable to be regarded as acute in nature, and of serious outlook, and considerable harm may be done by ordering too low and restricted a diet, when improvement frequently ensues with a more liberal diet. In amyloid disease of the kidney, unless complications, such as widespread dropsy, uræmia, &c., are present, a generous diet is also indicated, although in such cases the ultimate outlook is necessarily not so good as in syphilitic nephritis. In syphilitic nephritis, even where the amount of albumin passed is very large, an ordinary plain diet, into which fish and meat enter in moderate quantity, is to be recommended, unless uræmic complications are present. It is most inadvisable to diet the patient on considerations based on the intensity of the albuminuria. Many such cases present no marked symptoms of illness other than the albuminuria.

In granular kidney, restriction of diet, both in amount and character, is often very necessary. In some of these cases there are few, if any, symptoms of ill-health, and even when these are marked they are often to be referred to the vascular system. Many of these patients have been very imprudent in their habits, both as regards the nature of their food, and the amount, many of them being very large eaters. It is not only necessary to restrict the amount of food, but also to cut down the amount of fluid taken and to forbid stimulants. Much of this advice is necessary, not only from the point of view of the renal lesion, but still more on account of the general cardio-vascular degeneration, and very disastrous results, and even death, may follow the mere distension of the stomach by a large meal.

All food taken by such patients should be of the simplest character, and plainly cooked, all highly seasoned, spiced and concentrated meats, such as smoked meat, should be avoided. It is, however, neither necessary nor advisable to eliminate

meat from the diet; but it will be probably sufficient for one small meat meal to be taken in the day. At one time it was thought desirable to forbid red meat, and to restrict the diet to fish and chicken. It is now, however, generally recognised that such restriction is unnecessary, and that the most important points in determining the selection of proteid food should be rather its digestibility than any theoretical considerations as to the relative superiority of white over red meat. It is very necessary to forbid what may be called concentrated meats, such as smoked meats, as it is obvious that such foods contain very much larger quantities of proteid matter than ordinary fresh meat. Fish, although rich in nitrogenous extractives, is very suitable food, owing to its digestibility, and illustrates very well how the diet should be determined very largely by considerations based on digestibility rather than on the richness of the food in nitrogenous extractives. Most vegetables are suitable for such patients, with possibly the exception of asparagus and rhubarb, since the former may lead to a notable diminution in the amount of urine excreted, and the oxalates in the latter may give rise to hæmaturia.

The same principles should guide our diet in ordinary chronic Bright's disease, and nothing is more striking than the improvement which is frequently seen in such cases when a more liberal diet, with moderate quantities of fish, chicken, or even red meat, is substituted for the milk régime. Such patients are frequently very anæmic, and a notable improvement sets in so soon as a diet rich in blood-forming constituents is given.

Stimulants are probably harmful in all forms of chronic renal disease and are best avoided, and the consumption of tea, coffee, &c., should also be moderate.

THE DIETETIC TREATMENT OF DIABETES MELLITUS.

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The value of the dietetic treament of Diabetes Mellitus was first pointed out in 1797 by an English medical man—John Rollo, Surgeon-General of the Royal Artillery. Since that date its importance has been generally recognised. By many physicians, modification of the diet is now regarded as the only satisfactory treatment. But, whilst the dietetic treatment is often the most important, there are many cases in which it is useful to combine the dietetic treatment with treatment by drugs, such as aspirin and salicylate of soda. At least this is the opinion of the writer. By the use of these drugs, a decided reduction of the sugar excretion may often be obtained without placing the patient on a very rigid diet.[1] Further, there are some diabetic patients who will not tolerate much restriction of the diet, and in such cases the treatment must be chiefly by drugs.

When it is desired to accurately determine the action of any drug, or special form of diet, it is of course necessary to employ only one of these methods of treatment, and not both at the same time.

It is the general opinion that, broadly stated and with certain restrictions, the diet of the diabetic patient should consist chiefly of albumen and fat.

In the general treatment of most cases of diabetes it is desirable to determine, in the first place, the effect of this restricted or rigid diet. After this preliminary test the diet for the future may be prescribed. Most physicians now recognise the importance of varying the diet according to the form of the disease, and many have urged the necessity

[1] In the milder forms, I have often been able to reduce the sugar excretion markedly by the use of aspirin or salicylate of sodium, apart from dietetic treatment, see *British Medical Journal*, December 27, 1902, and March 30, 1901. *Lancet*, January 30, 1904.

for "individualising"—*i.e.*, for modifying the treatment in each case according to the condition of the patient.

A careful examination is necessary before the treatment is prescribed. It is important to determine whether there are present any complications, such as phthisis, nephritis, cardiac affections, severe constipation, &c. The weight should be taken, and the general condition of nutrition noted. The amount of sugar in the urine should be determined, and, on the earliest opportunity, the total amount of urine passed in the 24 hours should be estimated; and, perhaps most important of all, the urine should be tested for Gerhardt's (diacetic acid) reaction—claret coloration on the addition of a solution of perchloride of iron. This reaction, if persistent, is a sign of the most severe form of diabetes.[1]

With reference to treatment, cases of diabetes mellitus may be roughly divided into three groups:—1, mild cases; 2, cases of medium severity; 3, most severe cases. In the groups 1 and 2, the urine does not give any reaction with perchloride of iron. In the third group this reaction is present and often becomes intense. Those cases in which the urine gives a decided claret coloration with perchloride of iron, and also cases complicated with phthisis, or nephritis, require special forms of dietetic treatment: they will be considered at the end of this article.

In those cases of diabetes in which the urine gives *no* reaction with perchloride of iron, the action of a rigid anti-diabetic diet should be tried, and an endeavour should be made to determine the patient's power of assimilating carbohydrates. The patient should be placed on a diet containing chiefly nitrogenous and fatty food, with as little carbohydrate as possible. No sugar or sweet food should be allowed. Articles of diet containing much starch should be forbidden, and only green vegetables containing a very small quantity of carbohydrates allowed.

If the urine should become free from sugar in a few days, the case belongs to the mildest form of the disease. A small amount of white bread may then be added to the diet, and

[1] It is well to remember that when the patient is taking salicylates, aspirin, or antipyrin, a somewhat similar coloration is obtained. These drugs should be discontinued when it is desired to determine the form of the disease.

this amount gradually increased until the sugar reappears in the urine. The amount of bread, which must be allowed, before the glycosuria returns, is an indication of the quantity of carbohydrate the patient can tolerate, and of the mildness of the disease.

When the sugar excretion can be reduced to a few grammes daily by strict diet, but shows no signs of further diminution, Naunyn has pointed out the value of a "fast-day." For 24 hours the patient should take no food, except tea and bouillon, or vegetables, tea, coffee, cream and bouillon. In these cases, after the fast-day, the sugar often disappears entirely.

[When the urine gives the brown-red coloration with perchloride of iron, the rigid test diet, if tried, should not be commenced *suddenly*, since it is believed by many that by such a procedure, there is a danger of exciting diabetic coma. In these severe cases, and in many cases of medium severity, if it is thought desirable to try the effect of a rigid diet, it is best commenced cautiously, potatoes being excluded first and then bread, and afterwards other carbohydrates; and it is well to allow a few days to elapse before all carbohydrates are excluded.]

In the more severe forms of diabetes, in spite of the withdrawal of all carbohydrates from the diet, the sugar excretion in the urine continues, and its amount will be small or great in cases of different severity.

The following method of estimating the power of sugar destruction is recommended by v. Mering. A rigid diet of nitrogenous and fatty food is given. If the urine should soon become free from sugar, the case is one of the *mild* form. A small amount of white bread—100 grammes—is added to the diet, and the amount of sugar then excreted is estimated; the smaller the quantity, the greater the patient's power of sugar destruction and the more favourable the prospects of treatment. When the urine contains sugar, after several weeks' treatment with a rigid diet, the case is one of the severe forms. If the perchloride of iron reaction is also present, this is an indication of the *most severe* form.

Having determined the form of the disease and how much carbohydrate the patient can tolerate, the *future dietetic*

treatment may be prescribed. A record should be kept of the sugar excretion (daily or weekly), and the weight of the patient should be taken periodically. Except in cases associated with obesity, it is desirable that the patient should not lose weight.

In all forms of diabetes mellitus, sugar and articles of diet containing much sugar should be forbidden for the rest of the patient's life. In the mild forms, the preliminary test diet shows that in some cases the withdrawal of all carbohydrates is necessary to arrest the sugar excretion, and the smallest addition of white bread causes the sugar to return in the urine. In other mild cases the patient can tolerate a certain amount of carbohydrates (bread), and it is only necessary to *restrict* the carbohydrates in order to check the sugar excretion. In either case, the diet which is just sufficient to arrest the sugar excretion should be prescribed as the permanent diet.

After a period of restriction, it is sometimes found that the patient can tolerate more and more carbohydrates without sugar returning in the urine, and the diet may therefore be relaxed as regards bread and foods containing starch. But in the cases in which the exclusion of all carbohydrate food must be continued in order to prevent sugar returning in the urine, the patient often will not tolerate the rigid diet after some months, or it is found that he is losing weight on this diet. It is then frequently necessary to relax the diet, especially as regards the amount of bread; and one must be content if, by a moderate restriction of carbohydrates, one can keep the sugar excretion down to about 500 grains daily.

Though the tolerance for carbohydrates may sometimes be greatly increased, after a period of careful restriction, probably there is never perfect recovery, so that the patient can assimilate permanently *as much* carbohydrate food as a healthy man.

If the sugar cannot be reduced below 1 per cent. in spite of careful treatment, the tolerance for carbohydrates often diminishes steadily, and the disease advances. But there can be little doubt that, after middle life, the disease could often be kept in check, and the sugar excretion greatly reduced, or arrested, for many years, if not for the rest of life, if patients would continue to carefully carry out the dietetic and medical treatment. After the sugar has disappeared from the urine,

or has been greatly reduced, the patient's urine should be examined once a week or once a month, and any return or increase of the sugar excretion should be followed by a more rigid treatment.

In making accurate observations on the dietetic treatment of diabetic patients, it is of advantage to know the total value of the food as estimated in calories, *i.e.*, the total amount of heat that could be produced by the oxidation of the various articles of diet. In this way, a rough estimate can be formed as to whether the diet is sufficient for the needs of the system. One calorie is the amount of heat required to raise the temperature of 1 kilogramme of water 1° C. By oxidation, 1 grm. of proteid and 1 grm. of carbohydrate yield about 4 calories each, whilst 1 grm. of fat yields 9 calories. The quantity of these three substances being determined in the patient's diet, the value thereof can be expressed in calories. From this total, the value, in calories, of the sugar lost in the urine is subtracted, and the remainder ought to be not less than 2,500 calories daily. (This is the value of the diet in calories required by a healthy man.)

If the net value of the diet in calories be less than 2,500, then more fat should be given.

Naunyn recommends that, in the dietetic treatment of diabetes, the amount of the various articles of food should be weighed at first. Soon the patient is able to guess roughly the weight of the article from the size thereof, and weighing is then no longer necessary.

In addition, a few other fruits and vegetables, which contain only a small amount of carbohydrate, may be allowed in moderate or small quantity, especially when a very rigid diet is not necessary—raspberries, red currant berries, bilberries, blackberries, oranges, celery, sea-kale.

The diet sheet may be altered according to the nature of each case, and various articles included, or excluded, amongst the foods sanctioned.

As already mentioned, milk or a small amount of white bread (3 to 4 ounces = 100 grms.) may be added when a less rigid diet is thought desirable.

Articles of Diet.—No article of diet should be allowed by the medical man unless he knows approximately its

DIET SHEET (FOR RIGID DIET).

ARTICLES OF FOOD.

Sanctioned.	*Forbidden.*
Butchers' meat of all kinds (except liver); potted and preserved meats.	Sugar; sweet and farinaceous articles of food.
Ham, tongue, bacon.	Pastry and farinaceous puddings.
Poultry, game.	Rice, sago, arrowroot, tapioca, macaroni, vermicelli, semolina.
Fish (fresh, dried and preserved); sardines, shrimps.	Potatoes.
Bone marrow.	Wheaten bread and biscuits.
Broths, animal soups, and jellies (prepared without the addition of sugar or starchy materials).	Carrots, turnips, parsnips, beetroot, beans, peas, large onions.
Eggs, cheese, cream.	Liver.
Butter, suet, oils and fats,	Oysters, cockles, mussels, the "puddings" of crabs and lobsters.
Custard (without sugar).	Honey.
Reliable bread substitutes.	All sweet fruit and dried fruits (especially grapes).
Green vegetables, salad, mustard and cress, watercress, endive, lettuce, spinach, turnip-tops, cabbage, broccoli, Brussels sprouts, spring onions, French beans, asparagus, rhubarb, cauliflower, vegetable-marrow, tomatoes, rhubarb, melon, cranberries, green gooseberries (unripe), shaddock.	
Cucumber.	
Mushrooms.	
Pickles (cucumber, walnuts, and onions).	
Nuts (walnuts, almonds, filberts, hazel nuts, Brazil nuts), but not chestnuts.	
Saccharin, krystallose, saxin.	

BEVERAGES.

Sanctioned.	*Forbidden.*
Water; soda, lithia, potash, and seltzer waters.	Port, Tokay, champagne, Malaga, sherry, and sweet wines.
Tea, coffee.	Must, fruit juices, and syrups.
Claret, Burgundy, hock, Moselle, Ahr wines, most Rhine wines, Austrian and Hungarian table wines (in moderate quantities).	Sweet lemonade.
	Liqueurs.
	Beer, ale, porter, and stout.
Brandy in small quantities.	Rum and sweetened gin.
Sugar-free milk.	Cocoa and chocolate.
	Milk in large quantities.

chemical composition. The total amount of food should not be too great. The amount of each article of diet should

be known when any careful observations are being made. As Naunyn states, the chief rules with respect to diabetic cooking are:—No sugar; restriction of all that contains starch; and making up of the great deficiency caused thereby by fat and not by meat.

Nearly all kinds of *animal food* may be allowed—meat, fish, poultry, game, ham, bacon, eggs, &c. But liver, oysters, cockles, mussels, crabs and lobster, which contain much carbohydrate substance, should be avoided.

The patient should not eat enormous quantities of meat; but should only take an amount equal to that taken by a healthy man who is fond of meat. (Naunyn.)

Milk contains 4 per cent. of objectionable milk-sugar; but it contains also a large amount of valuable fat and albumen. The glycosuria is in some cases unchanged, in others increased, by milk. Cream, which contains less milk-sugar (3 per cent.) but seven times the amount of fat, may be allowed to all diabetic patients, as the total amount of sugar is small in the quantities of cream which can be taken. Devonshire or clotted cream is very suitable (milk-sugar only 1·7 per cent.).

Milk may be allowed in the very severe cases, and also in small quantities in those mild cases in which it causes no increase of the glycosuria. It is a useful addition when it is desired to relax the rigid diet. An artificial milk may be obtained which is free from sugar.[1] It is prepared according to directions given by Dr. R. Hutchison. It is put up in bottles, and most patients prefer to drink it diluted with water, or soda water.

The following is a method which I have employed for making an artificial milk, which is practically free from sugar. Four tablespoonfuls of cream are added to a pint of water, and well mixed. The mixture is allowed to stand in a cool place. At the end of 12 hours the fat of the cream, which will have floated to the surface, can be skimmed off with a teaspoon. On examination this will be found to be practically free from milk sugar, which will remain dissolved in the pint of water. The cream fat is skimmed off the surface of the

[1] From Messrs. Clay, Paget & Co., 23, Ebury Street, Eaton Square, London, S.W.

water in the first vessel and then placed in another vessel, and to it are added water, the white of an egg, a little salt, and a trace of saccharin (if desired). A palatable artificial milk can thus be prepared. This milk may be allowed freely in all forms of diabetes. (The egg albumen may be omitted, according to the patient's taste.)

Fatty foods are of very great value to the diabetic patient. The most useful are fatty bacon, the fat of ham and meats, cheese, the yolk of eggs, butter, suet, oils, cream, Devonshire cream, bone marrow, cocoa-nut powder (desiccated). A large amount of cream, 5, 10, or even 15 oz., may be allowed daily. In order to avoid sickness, it may be taken with a little soda water, or it may be added to milk (as Naunyn advises), or a teaspoonful of brandy may be taken to aid the digestion of the cream. Salmon, herring, duck, and goose are rich in fat. In the cooking of fowl, or meat, the addition of bacon or other fats is useful.

Bone marrow contains much fat, and is a valuable article of diet for the diabetic patient, if satisfactorily cooked. Desiccated cocoa-nut powder, on account of the large amount of fat it contains, is very useful in the preparation of cakes and puddings (*see* Appendix).

As regards *vegetables*, those which are suitable are indicated in the diet sheet. Green vegetables contain much less starch than root vegetables. In place of potatoes a few boiled walnuts may be allowed (with salt, pepper and butter).

When a very rigid diet is not necessary, a *small* amount of potatoes may be allowed—best in form of "potato chips," since a small quantity of potato swells out to a large bulk when cooked as "chips."

Rhubarb contains only 0·33 per cent. of carbohydrates (v. Noorden). When stewed and sweetened with saccharin or saxin it is a useful addition to the diet.

Sugar is more injurious than starch, and all kinds of sugar should be avoided in the preparation of food. Food may be sweetened, if desired, with saccharin, saxin, or krystallose. According to von Mering, glycerine has an injurious effect as regards the sugar excretion. Fruit-sugar (lævulose) and milk-sugar are less injurious than cane-sugar and grape-sugar,

and in mild forms of diabetes, a certain amount of lævulose and milk-sugar may be utilised in the system.

Fruits which contain much sugar—such as grapes, cherries, pears, apples, dried fruits, rasins, dates, and figs—should be forbidden. But the following fruits may be allowed, since they contain only a small percentage of sugar (chiefly lævulose), and non-nitrogenous extract (total percentage of both given in brackets) :—Cranberries (1·5), unripe green gooseberries (2–2·5), oranges, not sweet (2·5–3), raspberries (4–5), bilberries (4–5), blackberries (4), red currant berries (6–7). Cranberries and green gooseberries (stewed and sweetened with saxin or saccharin) may be allowed freely, the others in small or limited quantity.

Shaddock (forbidden fruit, or so-called "grape fruit"), a fruit like a large orange, but paler in colour and containing less sugar, may be allowed—one or half of one daily.

Melons contain only a small amount of carbohydrate ; a small quantity may be allowed.

Bread Substitutes.[1]—When it is desirable, in cases of diabetes mellitus, to prescribe a rigid diet free from starch and sugar, one of the greatest practical difficulties is to find a satisfactory substitute for bread. But this difficulty is much less than it was a few years ago.

Before recommending any diabetic bread substitute, the medical man should always test it for starch with a watery solution of iodine and iodide of potassium (iodine 1, potassium iodide 1, water 100). If a drop of this solution be allowed to fall on a piece of ordinary white bread, a deep blue-black colour is produced owing to the presence of starch. (The amount of starch in white bread is about 49 per cent.) Many diabetic bread subsitutes contain so much starch that they also become blue-black with the iodine solution. Such preparations are practically useless. I fail to see the advantage of diabetic bread subsitutes which contain only a little less starch than ordinary bread, or even of those which contain half the amount. It is far more satisfactory to employ a bread substitute practically free from starch, and, if it should be desirable to allow a limited amount of carbohydrates, to

[1] For a more detailed account, *see* writer's article on "Bread Substitutes for Diabetic Patients." *Medical Chronicle*, January, 1905.

give it in the form of a definite quantity of ordinary bread or potatoes, in addition to the diabetic bread.

It is necessary to test some bread substitutes (those containing almond or cocoa-nut flour) for sugar, and this can easily be done by the fermentation test.

Although so many diabetic bread substitutes are very impure, a number of trustworthy preparations, which are practically free from starch and sugar, can now be obtained.

The following are the most useful of these bread substitutes: —

1. Prepared from vegetable albumens:
   Roborat bread. Aleuronat cakes. Gluten bread.
2. Prepared from nuts:
   Almond cakes. Cocoa-nut cakes.
3. Prepared from milk albumens:
   Plasmon powder and biscuits. Protene bread and biscuits. Casoid bread and biscuits. (Kalari and pro-lacto biscuits.)

1. *Vegetable Albumens.—Roborat* is a vegetable albumen obtained from wheat. In addition to albumen, it contains fat, but only a small amount of carbohydrate. I have had it made into small rolls (*see* Appendix). On account of the satisfactory taste, and in spite of the small amount of starch which it contains, roborat bread may be recommended in cases in which a restricted, but not an absolutely rigid, diet is desirable. When given in place of white bread it often causes a marked diminution of the sugar excretion.

Aleuronat.—This is a vegetable albuminous substance, which contains only a very small percentage of carbohydrates. I have found that by mixing aleuronat and desiccated cocoa-nut powder, cakes can be easily prepared without the addition of any starch-containing material (*see* Appendix).

Gluten bread is one of the oldest bread substitutes; but many specimens of gluten flour and bread contain so much starch that they are practically useless. Such preparations are coloured deep blue-black with a drop of iodine solution. A few specimens, however, are satisfactory, and contain only 2 or 2·5 per cent. of starch. These may be allowed.

2. *Bread Substitutes prepared from Nuts.—Almond flour* and desiccated *cocoa-nut powder* can be employed for the preparation of diabetic biscuits. Both contain a little sugar, but this can be practically destroyed by the action of yeast.

Both almond and cocoa-nut cakes sometimes give rise to dyspepsia, owing to the large amount of fat they contain, but the dyspeptic symptoms may be prevented by taking a little alcohol (in some form) after eating the cakes.

Desiccated cocoa-nut powder is cheap, and excellent cakes and buns can be prepared from it. They have a marked action in reducing the sugar excretion. Cocoa-nut pudding can also be prepared, which forms a cheap and excellent substitute for rice and farinaceous pudding (*see* Appendix).

3. *Milk Albumens.—Plasmon* is an albumen prepared from milk. It contains 82 per cent. of proteids and is free from carbohydrates. Biscuits and cobs can be prepared from it.

Protene.—Protene is an albuminous substance separated from milk. It can be made into small cobs or rolls (*see* Appendix). Bread can be also obtained ready made from the Protene Co., as well as various forms of protene biscuits. These preparations are practically free from starch and sugar.

Casoid Bread and Casoid Meal Bread.—Both of these preparations are very useful; they are practically free from starch and sugar, and are composed chiefly of milk albumen.

Useful biscuits, composed chiefly of the same milk albumen, can also be obtained,[1] which are practically free from starch and sugar. (To these, the names of Kalari biscuits and Prolacto biscuits have been given.) These biscuits are often eaten with cheese and butter.

A combination of Protene and desiccated cocoa-nut powder forms an excellent bread substitute, and other useful combinations can be made.

With the exception of the Casoid preparations, the other bread substitutes referred to can be prepared at the patient's own home; and for several reasons home-made preparations are to be preferred.

From the bread substitutes just mentioned the patient may be safely allowed to choose the one preparation or the preparations which he likes best.

[1] From Messrs. Callard & Co., Regent Street, London, W.

Cocoa-nut cakes are excellent and cheap bread substitutes for those who like the taste, and for poor patients they are most useful. They contain a large amount of valuable fat.

As regards *beverages*, alcoholic and non-alcoholic, those which are free, or almost free, from carbohydrates may be allowed. They are indicated in the diet sheet. Wine probably aids the digestion of fats. Weak home-made lemonade (sweetened with saxin or saccharin, if desired) is a useful beverage. Ordinary beer and many non-alcoholic kinds of beer are injurious. Whisky and brandy may be taken in small quantities, but the amount should be limited.

The most severe Form.

In the severe forms of diabetes mellitus, in which there is a well-marked and persistent claret-coloured reaction in the urine with perchloride of iron, a rigid diet is not suitable; especially if the perchloride of iron reaction is becoming deeper. In fact, many physicians believe that, in these cases, a very rigid diet hastens the onset of diabetic coma. There is, however, much difference of opinion as to the most suitable diet. Sugar and articles of diet containing much sugar should still be forbidden in this class of cases; but the albumen in the diet should be diminished, the fat increased, and a small amount of carbohydrates allowed in the form of white bread (100 to 150 grammes) and of milk (1 to 2 pints daily). Also a small quantity of those fruits which contain very little sugar may be permitted. Large doses of bicarbonate of soda should be given in soda-water or in milk.

In this form both dietetic and drug treatment are unsatisfactory.

Many writers have recommended a milk diet, or a diet containing a large quantity of milk, in these severe forms of the disease. Several have recorded cases in which the addition of a small amount of potato to the previously rigid diet has apparently been of temporary service; and recently a trial of the oatmeal treatment has been recommended, but it is often of little service.

When *tuberculosis* is present as a complication, a rigid diet is not suitable. Sugar and sweet food must still be forbidden; the carbohydrates should be restricted, but not withdrawn.

Milk, cream, fatty food, and cod-liver oil are of value, and the treatment should be that suitable for phthisis rather than diabetes.

In cases complicated with *nephritis* a milk diet, or a diet containing much milk, is most suitable.

When these complications are present, the sugar excretion tends to diminish as the phthisis or nephritis advances; and the diet treatment should approach that suitable for these affections in non-diabetic individuals.

* * *

Recently considerable attention has been given to three methods of treatment:—The oatmeal treatment, the milk treatment, and the treatment with potatoes.[1]

The *oatmeal treatment* has been especially recommended by Professor von Noorden. The oatmeal has been given in the form of soup. In the mild forms of diabetes, the treatment is useless or injurious; but in the severe forms, with diacetic acid in the urine, it appears to have been occasionally of some value. It has sometimes caused a diminution of the diacetic acid in the urine, and a little increase of the tolerance for carbohydrates.

The treatment with large quantities of *milk* has sometimes been of service when coma has been threatening, and also in cases of diabetes associated with chronic nephritis.

Much has been recently written respecting the treatment with *potatoes*. Some diabetics can tolerate potatoes a little better than bread. Hence a small amount of bread may sometimes be replaced by potatoes. But most diabetic patients prefer to take the small amount of carbohydrate allowed to them as white bread rather than in the form of potatoes.[1]

[1] For account of the treatment by oatmeal, milk, and potatoes, *see* writer's abstract, *Medical Chronicle*, January, 1906.

APPENDIX.

DIRECTIONS FOR THE PREPARATION OF BREAD SUBSTITUTES, ETC.

PROTENE BREAD.

4 ozs. of No. 2 Protene,[1] 2 ozs. of butter, 2 eggs. Beat all together thoroughly. Divide so as to form 8 small cobs. Bake in oven.

PROTENE AND COCOA-NUT BREAD.

Mix together 1 tablespoonful of lukewarm water, ½ oz. of German yeast, 3 tablespoonfuls of desiccated cocoa-nut powder. Cover and leave in a warm place for about 20 minutes, until it is spongy; then add 3 tablespoonfuls of bran Protene, a pinch of salt, 1 egg well beaten up with a little milk. Mix all well together, place into tins, bake 20 minutes or longer.

COCOA-NUT CAKES.

1 oz. of German yeast, 4 tablespoonfuls of lukewarm water, 16 ozs. of desiccated cocoa-nut powder. Mix into a paste, adding a little more lukewarm water, if necessary. Leave in a warm place for 20 minutes. Then add 2 eggs (beaten up in 3 or 4 tablespoonfuls of milk), and a little salt. Mix well. Place into 16 small dishes or tins (well greased). Bake in a moderate oven 20 or 30 minutes.

(Almond cakes may be made in a similar manner, using almond flour in place of cocoa-nut powder.)

COCOA-NUT PUDDING.

½ oz. of German yeast is mixed in a little lukewarm water, with ¼ lb. of desiccated cocoa-nut powder. The mixture is kept in a warm place for 15 minutes. Then ½ oz. of butter, a pinch of salt, and a little milk are added. All must be well mixed. The mixture is placed in a pudding dish, and baked in a moderate oven for 20 or 30 minutes until the surface is brown. This pudding can be eaten warm or cold. It may be taken with custard and sweetened, if desired, with saxin.

ALEURONAT AND COCOA-NUT CAKES.

For the preparation of these cakes, 2 oz. of desiccated cocoa-nut powder are mixed with a little water containing a small quantity of German yeast. The mass is then formed into a kind of paste, and this is kept for half an hour or longer in a warm place. The small amount of sugar contained in the cocoa-nut is almost entirely decomposed by the fermentation produced by the yeast, and the cocoa-nut paste becomes spongy. 2 ozs. of Aleuronat, one egg beaten up, and a small quantity of water, in which a little saccharin or saxin has been dissolved, are now added to the cocoa-nut, and the whole well mixed until a paste is formed. This is spread out on a tin and divided into cakes, which are baked in a moderate oven for 20 or 30 minutes.

[1] No. 2 Protene can be obtained from "The Protene Co.," 36, Welbeck Street, London, W.

COCOA-NUT AND PLASMON CAKES.

Mix together 2 tablespoonfuls of cocoa-nut powder, a little lukewarm water, and $\frac{1}{4}$ oz. of German yeast, so as to form a stiff paste. Allow to stand (covered) in a warm place for about 10 minutes, until it becomes spongy, then add 3 tablespoonfuls of Plasmon, a pinch of salt, 1 tablespoonful of glycerine, and one egg well beaten up with a tablespoonful of milk. Mix all together. Divide into 4 to 8 tins. Bake for 20 minutes, or more.

PROTENE AND ALMOND BREAD.

Mix $\frac{1}{4}$ oz. of German yeast with 2 tablespoonfuls of lukewarm water and 1 oz. of almond flour (ground almonds). Allow the mixture to stand in a warm place for 10 minutes, then add 4 oz. of No. 2 Protene, 1 egg (beaten up), a little salt, $1\frac{1}{2}$ ozs. of butter, and a little milk. Mix all well together with a fork, divide into cobs, or place into small tins, and bake.

ROBORAT BREAD.[1]

To $\frac{1}{4}$ oz. of German yeast, add 2 tablespoonfuls of lukewarm water, and 4 oz. of Roborat, and mix into a paste with a little more water. Allow the mixture to stand in a warm place for 5 minutes, then add 1 egg (beaten up in a little water), 1 oz. of butter, and a pinch of salt. Mix all together into a paste with a fork, adding a little more water if necessary. Place into small tins and bake for 20 minutes.

[1] Roborat can be obtained from Messrs. Woolley & Co., Chemists, Manchester.

DIET IN GOUT, RHEUMATISM, AND ALLIED CONDITIONS.

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No hard-and-fast lines as to dietary can be laid down in the treatment of gout. Each individual must be carefully considered as regards his habit of body, his capacity for the digestion of different articles of food, the amount of exercise he is able to take, and the nature of his work. Derangements of the gastro-intestinal tract constitute a most important factor in the development of acute, chronic, and irregular gout. It is, therefore, of the utmost importance to secure and maintain a healthy condition of the gastro-intestinal mucous membrane, and a normal daily evacuation, in order to guard against auto-intoxication, which is undoubtedly an early factor in the development of the gouty condition. The individual who is subject to gouty attacks can certainly diminish the number and severity of the attacks, and in many cases can prevent their recurrence, by careful attention to diet, to the quality and the quantity of fluid taken, to exercise, and to a sufficient daily action of the bowels.

In advising as to the diet of any particular gouty individual, the personal factor is a most important one to consider, and it is wise to gain some knowledge as to the likes and dislikes of the individual with regard to food. In this connection it is well to remember the saying of Sydenham, that "more importance is to be attached to the desires and feelings of the patient, provided they are not excessive, than to doubtful and fallacious rules of medical art."

It should be well borne in mind that great changes in diet should not be made too abruptly. The researches of Pawlow show that a habit of digesting easily any particular kind of food is acquired by the stomach, which secretes a gastric juice appropriate to it, so that if the food is suddenly changed time is required for the digestive organs to accommodate themselves to the altered conditions. If the change is too sweeping and

too abrupt the patient will probably suffer. It is well known that the excessive consumption of rich nitrogenous food, combined with excesses in wine and malt liquors, both induce and excite gout. The comparative immunity of females and young people from gout is mainly explained by the absence of such determining causes of the gouty attack, combined with, in the case of young people, the absence of predisposing cause, and also the fact that the secreting functions are in full activity. The subjects of gout are generally persons who live well and consume a large amount of animal food.

Gouty people may for the purposes of the consideration of diet be roughly grouped into three classes :—

1. Those who suffer from more or less frequent attacks of acute gout.

2. Those who have never suffered from an acute attack, but who are constantly subject to some chronic form of regular or irregular gout, especially after slight indiscretions in diet.

3. Those who are only affected with gouty symptoms (generally of the irregular kind) when they eat or drink certain articles, and who, therefore, in order to avoid these gouty symptoms, have to be specially watchful over their diet.

ANIMAL FOOD.

As regards the question of meat, it must be remembered on the one hand that animal foods constitute to the majority of people the most attractive and appetising forms of diet, and are therefore likely to be taken in excess; hence the necessity for limiting the amount to be taken. But, on the other hand, it must be borne in mind that it is most desirable to increase the combustion and the oxidative powers within the tissues. In my opinion it is absolutely erroneous to exclude from the dietary of the gouty such articles as meat, fish, and tea because they are assumed to contain uric acid.

No class of foodstuff gives so great an amount of energy, and produces so much heat as animal food, and no class is more easily digested by the majority of gouty people. On the whole it may be stated that animal food, such as fish, chicken, game and meat, is best suited to the majority of gouty cases, whilst foods of the farinaceous class are most likely to disagree.

White meats, such as chicken and fish, are more digestible than red meats. The quantity of meat, and especially of red meat, must be restricted in those cases in which the kidneys are imperfectly performing their elementary functions, as evidenced by a pale urine, of low specific gravity, and deficient in urea and purin bases.

VEGETABLE FOOD.

A fair proportion of vegetable food should be taken with the meals each day. The choice of vegetables will depend upon the digestive capacity of the patient; but, excepting the potato, as a rule those vegetables that grow above ground are preferable to root vegetables. At the same time it must be borne in mind that with certain patients some of these vegetables may tend to produce some form of dyspepsia, and I cannot too strongly urge that in the dieting of the gouty no hard-and-fast rules can be laid down, but the idiosyncrasy of each patient to various articles of diet must be made the subject of careful observation and study. Due consideration should also be given to the patient's experience of what articles of diet disagree with him.

SIMPLICITY OF MEALS.

The diet of gouty patients should be simple, that is, the meals should not be made up of too many articles. Simplicity of food means facility of digestion. Moderation in both eating and drinking is perhaps one of the most essential points to insist on in the dietary of the gouty. Certainly meat, even red meat, should not be excluded from the diet.

Those articles of diet that are known in the individual to favour intestinal fermentation and putrefaction should certainly be avoided, and it may be taken, I think, as a general rule that a sense of discomfort after a meal indicates that some article or articles of food have been taken which are not beneficial to the individual in his present condition. If the gouty symptoms are due to over-production of toxic material from faulty intestinal and hepatic metabolism, and if at the same time the kidneys are sound, then a diet which mainly consists of animal food is indicated; and in extreme cases of this class even the so-called "Salisbury diet" may be useful. If, on the other

hand, the gouty symptoms are due to defective elimination on account of diseased kidneys, then a diet which is more vegetarian will be best.

The value of the so-called "Salisbury diet" consists in the small amount of energy necessary for the digestion of so simple a diet, and in the fact that it contains little which can set up intestinal fermentation or putrefaction. On the other hand, a strictly vegetarian diet requires more digestive energy than a purely animal one, and a much larger quantity of vegetable food must be taken to produce an equal nutritive effect. If, during the treatment of gout, an attack of gouty dyspepsia should at any time intervene, then a milk diet should be employed until the dyspeptic symptoms have abated.

STARCHY AND SACCHARINE FOODS.

Starchy articles of food should be especially limited in amount in those gouty individuals who are subject to gastric hyperacidity (hyperchlorhydria). When intestinal fermentation and putrefaction occur, as evidenced by a sense of discomfort after a meal, I attach great importance to the reduction of the starchy articles of food, but not to the total exclusion of, what I believe to be comparatively harmless, the potato. Undoubtedly, amongst those gouty patients who suffer from an inability to digest starchy articles of diet—in other words, who suffer from amylaceous dyspepsia—a reduction for the time in the amount of starchy foods taken, including potatoes, is desirable; but the recognition of the existence of amylaceous dyspepsia is a fairly easy matter, and when present it can be suitably treated. Certainly those who are gouty and fat should be very sparing in the use of potatoes, as of other carbohydrate forms of food. I wish, however, to protest against the too general exclusion from the food of the gouty of so common and useful an article of diet as the potato.

The best form in which potatoes can be taken by the gouty is the crisp form, which requires thorough mastication and insalivation. Boiled new potatoes should be absolutely interdicted to the gouty. Equally wrong, in my opinion, is the total exclusion of sugar from the dietary of all gouty individuals. Undoubtedly, in certain individuals sugar may

do harm, as in the cases of gouty persons who are fat, or who suffer from glycosuria, or who are prone to attacks of eczema, and in such it should be cut off; but that is no reason for the exclusion of it from the dietary of all gouty patients, especially those who are at the same time gouty and thin. I know of many gouty individuals who take sugar with absolute impunity. Some gouty subjects, undoubtedly, digest very badly all starchy articles of diet, and in such, fats may well take the place of starches. Fat bacon, properly cooked, is generally well digested by gouty individuals. Subjects who are both gouty and fat should avoid sugar, but, undoubtedly, sugar may be taken with advantage by those who are gouty and thin, and such subjects may also take in moderation marmalade and wholesome jams. Bread may advantageously be given as crisp toast, or in the form of rusks, or in the "Zwieback," or twice-baked form, as in these conditions it requires thorough mastication and insalivation.

FRUITS.

Any fruit which, from experience, is known to agree with the individual may be taken by gouty subjects. Apples and oranges generally agree best. Uncooked fruit should never be taken at a meat meal, and is best consumed fasting fairly early in the day, as between breakfast and lunch. It should always be thoroughly masticated. Strawberries are frequently avoided by the gouty owing to their producing in some subjects a certain amount of temporary irritation of the skin, but such irritation generally passes off in a short time. In a few subjects strawberries produce eczema, or some other rash, but such cases merely represent idiosyncrasy to the special fruit, and necessarily such individuals, whether gouty or not, should not eat strawberries. I am, however, strongly of opinion that the indiscriminate banishment of strawberries from the dietary of the gouty is unnecessary. Except in those cases in which there is an idiosyncrasy to their use, they constitute a good article of diet for the gouty, on account of their delicious flavour, their antiscorbutic properties, and their richness in potassium salts. It is, however, very necessary that they should be ripe and fresh. They are soon prone to decomposition, and in such a state they aid

in the development of those intestinal fermentations which are so inimical to the gouty.

ALCOHOLIC DRINKS.

Stated as a general principle, a person who is subject to gout is better without alcohol in any form. There are, however, some who require a little alcohol, either to aid digestion, or to enable them to get through their work. If alcohol is necessary or desirable, the form in which it is to be taken is frequently a matter which the patient can decide better than the medical man; but I would insist upon the importance of definitely limiting the amount to be taken, and of restricting its consumption absolutely to meals. Some patients find that a little whisky or brandy suits them best, others find a light still Moselle preferable, while a few, but in my opinion only a very limited number, find that a light claret agrees best with them. Champagne is a wine which is seldom suited to the gouty, especially if taken daily. In elderly people, or in the feeble, a moderate amount of pure whisky undoubtedly does good, but the indiscriminate ordering of whisky to gouty subjects is, I am sure, wrong. Port is a wine which is especially unsuited to the majority of gouty subjects. The gout-producing properties of the wine are, I believe, mainly dependent upon the ethereal compounds which give the aroma or bouquet to the wine. If this view is correct it would explain the well-known fact that old and matured ports are much more provocative of gout than comparatively new ports taken direct from the wood. The development of the ethereal compounds in the wine extends over many years, and especially progresses after the wine is laid by in bottles. In a few cases of asthenic gout, especially in old people, a moderate amount of comparatively new port taken direct from the wood undoubtedly does good.

In my opinion the wines which are least injurious as a rule to gouty subjects to whom it is found necessary to order a small amount of wine, are the light, still, white wines, such as Moselle, certain French wines, certain Austrian wines, Hock, and a few of the lighter Australian and Californian wines. The latter, owing to their great alcoholic strength, should be taken diluted with water or some mineral water.

Gouty subjects suffering from glycosuria or diabetes should entirely abstain from alcoholic drinks, unless marked debility and loss of appetite necessitate the restricted administration of them. Gouty persons subject to attacks of eczema are also much better without alcohol in any form.

"Rough cider," that is, the completely fermented apple-juice, taken in moderation, agrees well with most gouty subjects. It contains but a small percentage of alcohol, is free from sugar, and its acidity is chiefly due to malic acid, which passes into the circulation in the form of alkaline malates, which in their turn are converted in the kidneys into alkaline carbonates and excreted as such, thereby increasing the elimination of urates. The bottled or "champagne" cider, which is imperfectly fermented, should never be used by gouty individuals, owing to its undoubted liability to set up gastro-intestinal fermentations. Dry or "rough" cider mixed with an equal quantity of aërated water is an excellent beverage for the gouty. Dry perry is also a suitable drink for the subjects of gout.

DIET IN ACUTE GOUT.

During an attack of gout, a diet must be given which shall tend to check the abnormal metabolism of the gastro-intestinal tract and of the liver, which shall be non-irritating to the kidneys, and which shall be one that diminishes, as far as possible, the production of the purin bodies. For the first day or two of an acute attack the patient should be restricted to a milk diet, which may consist of milk, bread and milk, and tea made with boiling milk instead of with water. Weak tea with cold toast thinly buttered may also be taken. The free drinking of hot or cold water, of Salutaris water, or of some mineral water free from sodium salts should be encouraged. The milk diet should be continued until the acute inflammation is subsiding, which stage is indicated by the lessening of the pain, and by the pitting on pressure of the affected parts. No alcohol in any form should be given during this stage, unless there are strong reasons for its administration, such as a weak action of the heart and a feeble, irregular pulse, when a little well-matured whisky or brandy, diluted with Salutaris water, will prove the best form of alcohol. Beef-tea

and any of the meat extracts or essences should be avoided at all times by gouty patients, owing to the tendency they have to irritate the kidneys, and to introduce into the circulation waste nitrogenous bodies. With the subsidence of the acute attack the patient may return to a more liberal diet, but care should be taken to avoid anything indigestible.

ARTICLES OF DIET THAT SHOULD BE AVOIDED BY THE GOUTY.

Rich meat-soups: ox-tail, turtle, mock turtle, kidney, mulligatawny, hare, giblet.

Salmon, mackerel, eels, lobster, crab, mussel, salted fish, smoked fish, preserved fish, tinned fish.

Duck, goose, pigeon, high game.

Meats cooked a second time. Hare, venison, pork, lean ham, sweetbreads, liver, kidney, salted corned or cured meats, pickled meats, preserved and potted meats, sausages; all articles of food pickled in vinegar; all highly seasoned dishes and rich sauces.

Tomatoes, beetroot, cucumber, rhubarb, mushrooms, truffles.

Rich pastry, rich sweets, new bread, cakes, nuts, dried fruits, ices, ice cream.

DIET IN CHRONIC GOUT AND FOR GOUTY SUBJECTS.

The following plan gives an indication of the diet suitable for gouty subjects:—

Morning.—Half a pint to a pint of hot water, flavoured with a slice of lemon peel, should be slowly sipped immediately on rising.

Breakfast.—A selection may be made from the following articles of diet, according to the taste of the patient:—Porridge and milk, whiting, sole, or plaice, fat bacon, eggs cooked in various ways, dry toast or "Zwieback bread" thinly buttered, and tea infused for three minutes and then strained from the leaves. Fat bacon is digestible when grilled, but less so when boiled. Eggs should not be taken hard boiled.

Lunch and Dinner.—Soups suitable for the gouty are vegetable purées, and soups made by boiling beef-bones or mutton-bones with vegetables, and subsequently removing the

fat which separates on cooling. These soups should not be thickened with farinaceous substances.

The varieties of fish most suitable to the gouty are whiting, sole, turbot, plaice, smelt, flounder, grey mullet, and fresh haddock.

The birds that are admissible as articles of diet are chicken, pheasant, turkey, and game (not high).

Butcher's meat, mutton, lamb, and beef, should be taken at only one meal in the day, and then in moderate quantity. Two vegetables may be taken at both lunch and dinner. Any of the ordinary vegetables may be taken, except those previously mentioned as best avoided ; but those that are most likely to prove beneficial to gouty subjects are spinach, Brussels sprouts, French beans, winter cabbage, Savoy cabbage, turnip-tops, turnips and celery. Potatoes may also be taken in moderate quantities. Stewed fruits, or baked apples or pears, may be taken every day at one meal.

Green vegetables as salads may be taken, provided very oily dressings are avoided. A simple savoury may, if desired, be taken at the end of dinner, or a small quantity of cheese, if well masticated, and if free from the fungus or mould.

Night.—Half a pint to a pint of hot water, flavoured with a slice of lemon-peel, should be slowly sipped before retiring to bed.

With regard to persons who are disposed to gout, but are not actually suffering from it, the usual mixed diet may be taken, but they should limit the starchy articles of food, and should avoid all rich sweets, rice, tapioca and sago. Thin and ill-nourished subjects require modifications in their diet as compared with those who are stout, while those who take plenty of exercise can take food forbidden to the indolent. Individuals who especially benefit by a reduction of diet, both as regards quantity and quality, are those overfed people who are past middle life.

DIET IN RHEUMATIC FEVER.

A milk diet only should be given during the height of the attack ; to each pint of the milk 10 to 15 grains of common salt may with advantage be added. Beef-tea and all meat extracts should be avoided. Alcohol in any form is, as a rule, unnecessary.

Owing to the thirst engendered by the copious perspiration that occurs during the fever cooling drinks may be freely given in the intervals between the milk. "Imperial drink" constitutes an excellent febrile drink. It is made by dissolving a teaspoonful of powdered cream of tartar (potassium bitartrate) in an imperial pint of water or barley-water, and then sweetening to taste with loaf-sugar which has been flavoured by rubbing against the rind of a fresh lemon.

Another useful drink is prepared by roughly tearing a lemon to pieces, boiling it for ten minutes in a pint of water, straining through muslin, and then adding 20 grains of potassium bicarbonate, and some ice to cool.

"Tamarind tea" is another excellent febrile drink. It is prepared by stirring a heaped-up tablespoonful of tamarind pulp with a pint of hot water for a few minutes, straining through muslin, and then adding some ice to cool.

DIET IN "CHRONIC RHEUMATISM."

Under this heading are included not only the chronic joint affections, which may be left as sequelæ of acute or subacute rheumatism, and which may certainly and correctly be called true chronic rheumatism, but also that larger class of cases which are so commonly met with in practice, which are called "rheumatic," but which are not connected at all with what we know as true rheumatism. These are the cases in which the essential pathological change is an inflammatory hyperplasia of the white fibrous tissue in various parts of the body, to which the term "fibrositis" has been very aptly applied. They include the various forms of muscular rheumatism—lumbago, stiff neck, deltoid rheumatism, intercostal rheumatism, and also rheumatic neuralgia, Dupuytren's contraction, and chronic villous synovitis of the joints.

Unlike gout, no special dieting is required in these affections. Moderation should be the keynote of all prone to the various forms of chronic rheumatism and fibrositis, and especially should they avoid foods which their experience has taught them to be apt to produce gastro-intestinal fermentation. It is, however, absolutely unnecessary to indiscriminately prohibit such articles as red meats, sugar, jams, bread, fruit, &c., in the cases of sufferers from these affections. All these

articles of food, if they do not produce indigestion, are perfectly wholesome.

DIET IN RHEUMATOID ARTHRITIS.

The not infrequent mistake of diagnosing rheumatoid arthritis as gout, and the consequent placing of the patient on a restricted and spare diet, has undoubtedly led to the development of severe and incurable forms of this disease. It is essentially a disease that requires good and nutritious feeding, and I have seen many cases of rheumatoid arthritis which had gone thoroughly to the bad through the initial error of mistaking the disease for gout, and treating it with a spare diet. The diet should be as liberal and as good as the patient can digest, and animal food should be partaken of freely, though not to the exclusion of vegetables. The exclusion of the red meats, and of such articles as sugar, potatoes, cauliflower, peas, and beans, on the assumption that they do harm in rheumatoid arthritis, is, in my opinion, not only unnecessary, but is absolutely opposed to the treatment I have adopted.

A moderate quantity of wine or stout should be taken with lunch and dinner. Any kind of wine that agrees with the patient may be taken, but perhaps a generous red wine, such as Burgundy, is the most suitable.

THE DIETETIC TREATMENT OF OBESITY.

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THE bodily condition to which the term obesity is applied whilst familiar to all is not capable of any very precise definition. Inseparably passing from the normal state, the over-development of adipose tissue throughout the body cannot be said to constitute a disease, until the due and satisfactory performance of the various functions is interfered with. When that point is reached the condition calls for treatment, and it is in respect to one aspect of that subject, viz., the dietetic, that the following observations are directed.

That the principles which govern the treatment of obesity, no less than the details of their application, may be understood, it is necessary that the present state of our knowledge concerning the formation of fat in the body (lipogenesis) should be briefly set out.

In the normal adult male, the adipose tissue is reckoned to form about one-twentieth of the total body weight and rather more in the other sex, having first appeared at about the fourth month of fœtal life and progressively developing up to old age ; being liable to special increase, especially in females, at puberty and the climacteric. In the obese the over-deposition of fat occurs in the situations where this tissue is usually found, both subcutaneously and within the cavities of the trunk. In certain regions, however, such as the buttocks, the neck and chin, or over the abdomen, the fat may be preponderantly developed even beyond that of the general surface. The fat is also stored to a slight extent in the muscles and very largely in the liver.

The body fat is derived directly or indirectly from the food ; directly from the fat, though this is to an inconsiderable extent, since in an ordinary diet these substances form but a small proportion of the total intake ; indirectly the fat is formed from the proteid and carbohydrate foodstuffs. It is important to remember this threefold source of the body fat since it at

once shows that no possible diet can of itself entirely prevent fat formation. At the same time it is equally important to realise that the chief source of the fat in the tissues is the carbohydrate food under normal circumstances, but that the complete exclusion of sugars and starches from the dietary does not avert the formation of fat from the fat and proteid ingesta, and it is even possible that under such conditions a larger amount of fat is formed from the nitrogenous aliment than is ordinarily the case. The ingested carbohydrates, whatever may be the form in which they are taken, are absorbed into the blood mostly as dextrose. By condensation the dextrose is converted into glycogen, in which form the greater part of the carbohydrates are stored, chiefly in the liver and the muscles, until they are made use of in the tissues. It is also supposed by many that some of the dextrose enters into the construction of certain proteids and nucleo-proteids. Sooner or later, however, the greater part of the carbohydrates are converted into fat, which also is stored up in the cells, especially in those of the connective tissue forming the fat cells of the adipose tissue. The exact chemical stages of the conversion of dextrose into fat are far from being completely known, but it is probable that the decomposition products of the former are synthesised. Among these products lactic acid is prominent, and there is good reason to believe that this substance is further converted into butyric or allied acids in the liver, and that, from these lower terms of the fatty acid series, the higher members palmitic, stearic, and oleic are built up. Probably also the glycerin, with which these acids combine to form the neutral fats of the body, is derived from the sugars. But, although precise knowledge on these points is wanting, it is not open to doubt that the bulk of the fat of the body is normally formed from the carbohydrate ingesta, far exceeding in amount that derived from the fat constituents of the food.

Whether any of the body fat is ordinarily formed from the proteids either of the food or of the tissues is very difficult to answer. It is generally supposed that it is, the proteid molecule being split up into a nitrogenous moiety which becomes urea, and another portion which may become glycogen, and so perhaps fat. In healthy conditions there is no reason to suppose that the amount of fat so formed is appreciable. One of

the strongest arguments hitherto adduced for the view that fat may be a product of proteid decomposition is the occurrence of fatty degeneration which is met with in cells and muscle fibres, the very obvious fat seen under such circumstances having always been regarded as originating from the nitrogenous constituents of the tissues. Recent experiments, however, have cast much doubt upon this point, and have tended to explain the fat that appears in the degenerate tissues as being transferred as such from some fat depôt—adipose tissue or other—though admitting the possibility of a small amount being formed from the fat, which is combined with the protoplasmic molecule, or from such bodies as protagon and lecithin.

Although the ultimate destination of the fat in the body is that it should undergo oxidation with the liberation of energy—heat, muscular and nervous action—it may be doubtful whether the ingested fat, or that derived from the carbohydrate and proteid foodstuffs, is at once made use of. It is certain that much, and probably all, is stored up in connective tissue cells as adipose tissue, from which it is from time to time liberated by ferment action—lipase—similar to that which takes place in the intestine during digestion, and possibly again stored before its final combustion in the muscular and nervous tissues. In respect to this alternation of a "resting" and "circulating" condition, the fats correspond to the proteid and carbohydrate alimentary principles, both of which are "fixed" in the tissues, whence by ferments they are set free into the blood and lymph streams as occasion requires. In reference to the ultimate destination of the body fats, allusion may be made to a view that is held in some quarters concerning the origin of the sugar and acetone in diabetes, which seeks to ascribe them to decomposition of the body-fats, the latter substance being derived from the fatty acids, the sugar from the glycerin radicle. Theoretically, no doubt, sugar may be constructed from glycerin, and the frequent association of diabetes with obesity may give some support to the suggestion, but it cannot be said that any reasonable proof that the change takes place to any appreciable degree in health.

A consideration of the circumstances connected with the normal formation of the body-fat suggests the directions in

which may be sought the determining causes of an excessive development, and clearly shows that the responsibility for obesity lies, not only in the nature of the ingesta, but even more in the behaviour of the living tissue elements themselves, and that, as a corollary thereto, the regulation of the dietary of the corpulent may be, and frequently is, but one of the methods to be pursued in the treatment of the condition. It is in the recognition of the cause or causes of obesity that its rational treatment is to be based.

Inasmuch, then, as the body fat is derived from the food which represents the potential energy of the organism, which should normally be converted into actual energy chiefly by oxidation in the tissues, an accumulation of fat usually expresses a disturbance in the relation of the ingesta to the work done.

The first and most obvious determining factor of the state is an excessive intake, whether this applies to all the alimentary principles to be found in an ordinary diet, or only to special ingredients. Although our notions as to the actual amount of food required to maintain the active body in health have recently undergone considerable alteration, as the result of experiments conducted in America by Professor Chittenden, these results require the further test of time and repetition before being accepted as of general application in the face of all but universal experience against them, and, for present purposes, what has hitherto been regarded as the basis of a normal diet is accepted. This may be represented by $3\frac{1}{2}$ ounces proteids, 3 ounces fats, 14 ounces carbohydrates, reckoned free from water. The relative proportion of fat and carbohydrate may vary, provided that the total Calorie[1] value of the diet be at least 3,000. To these constituents must be added 3 to 4 pints of water.

Now, although it is quite true that large eaters may and frequently do become unduly fat, it by no means follows that they will of necessity do so; and indeed many persons, especially women who are excessively corpulent, are, on the contrary, very moderate or even small feeders, not consuming nearly the amount above set down as the normal. With

[1] A Calorie is the amount of heat required to raise the temperature of 1 kilog. water through 1° Cent.

this may be mentioned that some persons, who habitually exceed, even to a large extent, the normal intake, may be rather below than above the average weight, or may even be distinctly thin, and no amount of food will make such people fat; and such differences, which are constantly being met with among perfectly healthy people, are not to be explained by their habits of life, the most important influencing circumstances in the writer's experience being heredity. It has been put forward as an explanation of some of these cases of considerable eaters who nevertheless do not put on fat, that this is due to defective digestion and absorption in the gastro-intestinal canal, a large proportion of the food stuffs passing away in the fæces, and, consequently, not to be considered in comparing the fat accumulation in the tissues with the intake. Whilst, therefore, an excessive dietary may lead to obesity, it as certainly, though not as often, may not, showing that something else besides the food has to be taken into account. Further, what is true of a dietary that exceeds in all its constituents is almost, if not quite, as true of an inordinate consumption of certain individual ingredients. Thus, it frequently happens that a large excess of sugar or starchy food is taken, with the result that the individual puts on fat, but very considerable differences exist among people as to the extent to which obesity will develop from this cause, and, not at all uncommonly, the degree will be but slight. It must be remembered that this carbohydrate excess is often accompanied by a much reduced proteid intake, a circumstance which may contribute to excessive fat formation. It is not very often that the fat constituents of the diet much exceed the average amount, but the natives of the arctic regions, who habitually consume large quantities of blubber, are well known to be considerably fatter than the average inhabitant of temperate or hot climates. As a general rule, a large increase of fat to the ordinary diet is not well tolerated by healthy persons, and the excess, instead of being digested and absorbed, is voided in the fæces; when, however, the individual's weight has been much reduced below the normal, a far larger amount of the fat is absorbed.

With regard to the nitrogenous constituents of the diet the case is very difficult. For though a small amount of the

body fats as said may be derived from the splitting of the proteid molecule, no accumulation will result from a largely increased proteid intake, but rather the reverse, since it is fully recognised that the protoplasmic metabolism is stimulated by the nitrogenous ingesta with accompanying increased oxidation of the fuel foods—fats and sugars. The effect of a large proteid dietary with a diminished amount of carbohydrate ingesta is to be seen in the spare, hard, well-knit frames of the hunters on the plains of America, whose food consists almost entirely of meat.

A second condition which contributes to obesity is diminished muscular exercise, that is to say, a diminished oxidation or using up of the fats of the body. If the quantity of food which is taken under such conditions is decreased, the over-formation of fats may not be appreciable, but if, as is frequently the case, the sedentary life is accompanied by a full or over full dietary, then obesity, to a greater or less extent, is of most probable occurrence. But it must be clearly realised that though very probable, it is by no means inevitable, and that very considerable corpulence may be associated with a very fair degree of muscular activity ; just as the converse is not infrequently met with, an inactive life with a full ingestion together with a body weight that may even be under the normal.

It might perhaps be supposed that the fat accumulation is, in part, due to diminished metabolic activity of the cells of the body, but recent experiments on the respiratory gas exchange in the obese do not show that there is any lessened oxidation, at least in the fasting state, when the individual is at rest. But whereas the ingestion of food in an ordinary person determines an increased oxygen consumption, this does not appear to take place in the corpulent to anything like the same extent, consequently therefore the fat person stores up a greater portion of his food during this period than the individual of normal build, and so contributes to his obesity.

Whilst the nature and amount of the food and the extent to which it is used in the body, as measured by the degree of muscular activity, are doubtless the most important conditions affecting the formation of the body fats, the account that has been given of lipogenesis indicates at least the

possibility of other factors having to be considered, between, so to say, the extremes represented by diet and exercise—the income and the output. The series of complex chemical changes which take place in the digested and absorbed fats and carbohydrates, are brought about, as we have reason to believe, by ferments, many of which have been found in the tissues, some, possibly, contained in the internal secretions of certain ductless glands. Broadly speaking, we conceive the series of changes to consist in those of a synthetic character, such as the re-formation of fat from the fatty acids and glycerine in which form they have passed through the intestinal epithelium; the storing of such fat in the adipose tissues; the subsequent splitting of the same to allow of its translocation from the depôt to the tissues in which it is consumed—the last two groups of changes being very possibly repeated more than once; the analytic and subsequent synthetic changes by which the sugar in the body is converted into fat; and lastly, the oxidation changes by which the fat is decomposed, either within the protoplasmic molecules, or within the sphere of action of the living matter. It is obvious that whilst some of these bio-chemical processes make for the formation of the body fat, others effect its removal, and defects in these changes, as, for instance, from a lack of those tissue ferments by which the fat is rendered circulating, or of those by which the oxidation takes place, the adipose tissue would accumulate and obesity result. It is not suggested that the foregoing represents with completeness what occurs in the body, but it does suggest the kind of interactions that go on, conformably with the most advanced knowledge of the subject. The essential point is that the living elements of the tissues have to be considered in a complete purview of fat formation, that they have a responsibility for obesity as well as the food from which the fat is, of course, derived, and, that it is in the directions here indicated that is to be found the explanation of those excessive fat depositions that are hereditary, or that take place at certain periods of life, notably the climacteric in women, or as localised outgrowths forming fatty tumours. Nor does this exclude the possibility of the errors of nutrition that result in either obesity or emaciation being induced by a perversion of the normal trophic influence emanating from the nervous centres.

To some extent there is a difference to be noticed in the appearance of those whose obesity is associated with over-eating, and those who, whilst in no way exceeding the average intake, which may even fall below the normal, are yet unduly corpulent. The former are usually full-blooded and plethoric, and may exhibit glycosuria, and it may be observed, as a rule, improve considerably on dietetic treatment. The others, whose obesity is of intrinsic rather than of external origin, are apt to be pale and flabby, incapable of much exertion, and yielding but little to a restricted regimen. These cases have been regarded as being to some extent allied to myxœdema.

From this account of the nature and causes of excessive formations of the body fat, may be inferred the principles that regulate the dietetic treatment of the condition. The problem presented being so to regulate the nutrition as to avoid further storage of fat, and to work off by oxidation the excess which has already accumulated. As the diet is, without doubt, one of the most important determining causes of obesity, so, within limitations, it is the chief means of dealing with the affection, but it is seldom the sole method, and alone it may almost be ineffectual. When the corpulence is associated with an excessive intake, the reduction of the dietary as a whole may be imperatively called for, but since it is the carbohydrate constituents of the food that are the chief sources of the fat, so it is their reduction that has especially to be taken in hand. The ordinary amount of fat taken, one or two ounces, may be in great measure disregarded, unless the regimen be particularly severe. And the nitrogenous food may be increased, since by its metabolism the consumption of the body fat is stimulated, and the individual lives on his own tissues. The calorie value of the daily diet may require to be diminished to one half to normal, or even less (1,000 Calories).

Such being the principles of the dietetic treatment of obesity, there is nothing in their application of a mysterious character, or that justifies the assumption of any claims to specialism in respect to the management of the condition. It clearly follows, from what has been said, that the most effectual dietary to bring about a reduction of the body fat would be one consisting of proteids only, and lean meat and water, preferably hot, is a well-recognised method known as

the Salisbury treatment. According to this plan, for at least the first fortnight of the treatment, 3 lbs., or less, of lean meat are consumed daily, this amount being equally divided between breakfast, luncheon, and dinner. The meat should be taken as lean beef steak grilled, or roast joint. Originally it was recommended that the meat should be minced by hand or machine in such a way as to remove as much as possible of the connective tissues and gristle, leaving only pulp, which, being moulded into small cakes, was then boiled and seasoned with pepper and salt. Much difference exists among individuals as to the tolerance of such a dietary, all starch foods and fats being excluded (except the small quantity of fat that is inseparably contained in the leanest meat)[1]; by some it may be continued for several weeks, and it is permissible to substitute an equivalent amount of boiled or grilled cod-fish at one of the meals, if the full quantity of meat cannot be taken. Care should in all cases be taken to ascertain that the kidneys are healthy, and frequent examinations of the urine should be made during the course of treatment. A loss in weight of several pounds per week often follows such a regimen, but it is not desirable that this should exceed three pounds.

In the opinion of the writer, however, such a plan is seldom desirable, and it is preferable to treat the majority of cases by less severe methods, or to proceed more gradually, reducing the total amount of food, and more especially diminishing the quantity of carbohydrates taken. It is difficult to lay down a rule as to the exact amount of the different alimentary principles that should be given, so much depends upon the quantity habitually taken by the patient, as well as his particular tastes and tolerance of different foods. It is the writer's practice at the commencement of the treatment at once to cut off all the sugar taken as such, if necessary substituting saccharin, and to reduce the starch foods and fats by one half, and to pursue this plan for three weeks or so, the weight being regularly taken. If there is found to be a weekly fall in the weight, the plan is continued, but, if there be no diminution, or, but very little, and the patient complains of feeling unsatisfied and hungry, then for the bread foods and starchy vegetables

[1] It should be remembered that roasted lean beef contains about 8 per cent. of fat.

should be substituted various breads, biscuits, cakes, rusks and puddings made from "flour" that is prepared from the proteids of milk, such as the different "protein" and "plasmon" preparations which contain but a very small quantity of carbohydrates and about 80 per cent. of nitrogenous matter, thus uniting the fundamental requisites of the dietary for fat accumulation.

It is in accordance with the foregoing principles that the various dietaries of Harvey-Banting, Oertel, Ebstein, Salisbury, and others, have been formulated, which differ among themselves as to relative proportions of the several alimentary principles allowed, but all agree in giving relatively more of the nitrogenous and less of the fat and starchy foods than obtain in the ordinary meals. The following table shows some of these dietaries expressed in round numbers, compared with the generally accepted requirements of an average adult doing moderate work, it being understood that the solid constituents are *reckoned as being free from water* :—

Dietary.	Proteids.	Fats.	Carbohydrates.	Calorie Value.	Fluid as Beverage.
Normal	oz. 3½	oz. 3	oz. 14	3,000.	Pts. 3-4
Harvey-Banting	6	½	2½	1,100	2
Oertel	5½–6½	1-1½	2½–3½	1,200–1,600	1-1½
Ebstein	3½	3	1¼	1,300	3
Van Noorden	5½	1	3½	1,350	2

Expressed as ordinary articles of food, these figures would represent in the Harvey-Banting plan for the twenty-four hours, 12 to 15 ounces of lean roasted meat (except pork) or poultry, game, kidneys, or boiled white fish, distributed between breakfast, dinner, and supper; about 3 ounces of toast, rusk or biscuit divided among all the meals; several ounces of fresh or stewed fruits; a large cup of tea without milk or sugar at breakfast and in the afternoon, and half a pint of good claret divided between dinner and supper. The other systems conform rather to the continental arrangement of meals except van Noorden's, which directs the administration of a small quantity of food every two hours. Of these

Ebstein's is perhaps more usually followed in this country, and this dietary consists of a fairly thick slice of bread with plenty of butter, and a large cup of plain tea for breakfast; a plate of clear soup with 5 ounces of cooked meat, green vegetables, fruit, and about half a pint of light wine for dinner; for tea, the same as at breakfast; and for supper, an egg with 3 or 4 ounces of meat, fish or ham, half a slice of bread and butter, a small piece of cheese and fruit with tea, as before. Since, according to this plan, there is no restriction to the fats, rich sauces are allowed.

It will be seen that, although these various diets differ among each other in certain details, they all agree in presenting a much reduced calorie value with the aim of making up the deficiency in this respect from the fat of the tissues. It is difficult to say that one is better than another, each has its advocates and can point to successes. Much depends on the habits and tastes of the patient and the degree to which the sense of hunger is appeased. Although no steps should be taken to encourage an appetite, its loss by a monotonous diet is to be deprecated, since appetite alone plays an important part in stimulating the flow of gastric juice and so effecting proteid digestion, which is of the greatest importance, since this form of aliment is so largely increased in all the dietaries for the obese. Ebstein's system, it will be observed, furnishes a large amount of fat, which is not always tolerated. This plan is with the object of protecting the body proteids from waste and satisfying the sense of hunger, but it is of doubtful efficacy in these respects and takes no account of the increased metabolism of fats by proteid changes. In contrast to this regimen, Oertel's system is marked by a very restricted consumption of fats, and especially by a very diminished fluid intake. As the general consensus of opinion is in favour of strictly limiting the fats, it is advisable to avoid pork, veal, ducks, geese, salmon and eels, since these contain an undue proportion of that material. The substitutes for sugar and for starch foods have been already mentioned, but it is well to emphasise the fact that bread loses little, if any of its carbohydrate value by being toasted, and ordinary cakes and biscuits are scarcely more allowable than bread itself. Potatoes, which are of about one third the calorie value of bread, can only be permitted when the dietetic restrictions are not severe, but they form a grateful occasional

substitute for such starch food as is allowed, or as an addition when the desired loss of weight has been accomplished. Parsnips, carrots, peas, and broad and haricot beans are in the same category, but green vegetables, salad and fresh fruits in small quantities, raw or cooked without sugar, are permissible.

Much difference of opinion has existed concerning the amount of fluid that should be taken, some holding that a large fluid intake favours fat formation; whilst other observers affirm the reverse. Here, again, it is well to consider the usual quantity of fluid taken by the individual and proceed accordingly, since there is no satisfactory evidence that the quantity of water taken certainly affects the tissue metabolism. In the anæmic obese, with flabby hydræmic tissues, a diminution in the fluid intake may be advisable; but it is certain that, as the diet becomes increasingly nitrogenous, fluid should be given, and almost without limit, to wash out the excessive waste. Many of the dietaries are decidedly faulty in this respect, that recommended by Oertel distinctly so. When only meat is eaten, it is well to diminish the quantity of liquid ordinarily taken at meals and to take a pint of hot water midway between. Tea, with a slice of lemon or saccharin, and neither milk nor sugar at breakfast and tea-time, plain, or effervescing, or Vichy water, with occasionally (if stimulants are habitually taken) a little whisky or white Rhine wine at lunch and dinner. Beer and sweet wines, spirits (with the exception mentioned), and liqueurs are absolutely forbidden, since alcohol itself is, in fact, a fat-sparer, that is to say, is oxidised, in place of the fats of the food, which thus can be stored up, and add to the body weight, whilst the sugars which occur, more or less, in almost all wines, beers, and spirits, only increase the mischief. Black coffee, if usually taken, need not be discontinued; cocoa and chocolate, owing to the large quantity of fat and carbohydrates they contain, are inadmissible.

Finally, in regard to the dietetic treatment of obesity, the following general remarks may be made by way of recapitulation. It is undesirable to recommend any very restricted treatment, unless the individual greatly errs in an excess in diet, or unless there is an actual manifestation of symptoms due to the accumulation of fat, or a general interference of well-being due to the corpulence. Some people are very

stout, and yet very well; such should be left alone. It should be pursued with the greatest care, or in a modified form, by those suffering from chronic disease, or by the aged. Each case must be treated in view of age, sex, hereditary predisposition, habits of life, and previous amount of food and kind thereof, and not with a blind adherence to any one hard-and-fast dietary as applicable to all. It is well to commence gradually, and not suddenly, to feed a patient on a very restricted scale; the weekly loss in weight should not exceed three pounds. As a preliminary, it is very desirable to have the urine carefully examined, and a record kept of the nitrogen excretion, and this should be repeated from time to time during the treatment; the existence of albuminuria should be a bar to any great increase in the proteid food. The patient should be constantly seen during the progress of the regimen, and its details modified as occasion may require; for it is to be remembered that the amount of food allowed may be very much less than is required in health; and occasionally persons suffer very distinctly by the treatment. A very much increased nitrogenous ingestion is not always borne with impunity, especially if the fluid-intake be limited, and the circulation of imperfectly oxidised products of nitrogenous waste may determine cardio-vascular troubles. No rule can be laid down as to how much weight the patient should be allowed to lose; it depends on his original bulk, and the state of health under treatment; but it is seldom advisable to pursue the regimen strictly beyond a loss of two stone, and often not to that extent. And, lastly, it is to be recollected that some cases, however carefully considered may be the diet, and however faithfully carried out, will not benefit, just as there are lean individuals whom no amount of feeding on strictly physiological lines will fatten. When a sufficient reduction of weight has been effected, a greater licence may be permitted; but it is probable that sugars will require to be permanently excluded, and farinaceous foods constantly restricted in amount. The efficacy of a dietetic regimen is likely to be conditioned by other procedures, and prominent among them is exercise; but the nature and value of this, as of drugs, constitute another chapter in the treatment of obesity.

ON DIETETICS IN CONSUMPTION AND OTHER WASTING DISEASES.

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THE question what is the proper kind of diet for consumptive patients is one regarding which, among those best qualified to judge, there is at the present day no essential difference of opinion. Good feeding, a generous diet, consisting of judicious proportions of meat, fish, eggs, dairy produce, bread, vegetables and fruits, is considered to be equally important with an abundant supply of fresh air for the successful treatment of the disease. We cannot shut our eyes to the fact, however, that, in some quarters, the idea has got abroad that it matters not what the patient puts into his stomach, and that it is a necessary part of the treatment that he should habitually over-eat. There is no doubt that, at the present day, consumptive invalids are sometimes fed neither wisely nor well. *In medio tutissimus ibis* is the best rule of practice; underfeeding and over-feeding are equally bad for the patient.

Before considering in detail the dietetic management of consumptive patients, it will be profitable and instructive to glance back over a few score years, and try to realise what were the views regarding diet which formerly prevailed. A famous physician of last century, Dr. C. J. B. Williams, has put on record what was the ordinary course of the disease at that time. "My general recollection," he says, "of the histories of the developed disease at that time (1830 to 1840) is that of distressing tragedies, in which no means used seemed to have any power to arrest the malady, and life was rarely prolonged beyond the limit of two years assigned by Laënnec and Louis, as the average duration of the life of the consumptive." The patients, we learn from Graves, were "anxiously confined within doors during winter, were kept wrapt up in flannel in rooms maintained at a Madeira temperature, were not allowed animal food, and were bled to the amount of a few ounces at each

accession of a fresh cold." The diet of incipient curable phthisis, according to such an eminent authority as Stokes, of Dublin, must needs be of the least stimulating kind, such as milk, farinaceous substances, and light vegetables. The fever of the disease was to be met by antiphlogistic measures, and the low diet was the complement of treatment by venesection, leeching, issues and the administration of lowering drugs, like tartar emetic. "All the diet," it was taught, "ought to be calculated to lessen the acrimony of the humours. For this purpose, he must be kept chiefly to the use of vegetables and milk. Milk alone is of more value in this disease than the whole materia medica." Asses' milk was thought to be specially valuable as a food, and, in some cases, even woman's milk was ordered as the best food for adults. Against the low-diet form of treatment some, like Graves of Dublin, whose justly proud boast it was that "he fed fevers," were found brave enough to enter a protest. Wisely and humanely, he proclaimed that the consumptive invalid was not to be treated by semi-starvation, but needed plain wholesome food. "Make your patient," he said, "lay aside slops and tea; let him take wholesome fresh meat, bread and good beer." Meat, bread and beer for breakfast, meat for luncheon and dinner, with one or two glasses of wine in the evening, was the regimen he recommended.

Changes in medical practice are, however, only slowly and gradually brought about, and even the treatment of to-day is more than we realise unconsciously influenced by the exploded ideas, founded on the utterly false pathology of a distant yesterday. We are told by Sir Thomas Watson that, in his time, there was "a great discrepancy of opinion among authors and among practitioners with respect to the regimen which consumptive persons should follow." "One man gives all his patients beefsteaks and porter; another restricts all his to vegetables and asses' milk." With Sir Thomas Watson and his school, the object was to sustain the patient's strength without exciting inflammation in his lungs. The low diet was to be given, if there were signs of an inflammatory condition of the pulmonary substance, but a full and generous diet might be given "when the disease manifested a tendency to transgress its specific limits," what-

ever that might mean. Gradually experience showed that the generous diet was that on which the patient did best, and Sir Thomas Watson recognised that "the commonest error of the two was that of reducing the patient's strength by a needless restriction of his nutriment lest inflammation should ensue." The effects of a more enlightened treatment are thus recorded by Dr. C. J. B. Williams: "In the next period of 10 years (from 1840 to 1850) a marked improvement took place in the results of treatment, apparently in connection with the allowance of a more liberal diet and the habitual use of mild alterative tonics."

Walshe, who had similar experience of both plans of treatment, gave no uncertain sound as to their comparative merits. "The diet of the consumptive," he said, "should be simple and nutritious. Without being an advocate for the 'mutton chop and porter' plan, I am perfectly convinced that a low diet is seriously injurious."

The practice of the Brompton Hospital, from the earliest times up to the present day, has been to feed the patients well, and the dietary now in use differs but little from that of twenty or thirty years ago. The provision of food is one thing, however, and the getting the patient to take it is another, and it is probably with regard to the latter that modern methods show a striking improvement on the past.

In the modern method of treatment of tuberculosis, our main efforts are directed to improving the patient's nutrition. Wasting of the tissues can only be combated by the assimilation of food, and one of the chief effects of a constant supply of fresh air is the stimulation of the appetite, and an increased metabolism. In the ordinary course of the disease, the patient loses flesh, and his appetite fails. Left to himself he eats too little to repair the waste. To overcome the disinclination to take food, and to get the patient to consume an adequate amount, are problems which demand, on the part of the physician, both resource and judgment. It is an undoubted fact that, placed under good hygienic conditions, the consumptive patient can perfectly digest and assimilate a great deal more food than he has inclination for, or than he has previously been in the habit of taking.

To get the patient to eat enough is the object to be aimed

at, not, it should be needless to say, to make him over-eat. With judicious feeding, the patient's weight should be gradually brought up to the normal standard. To go beyond this, and so to possibly turn what is called a genteel figure into one resembling that of a portly overfed alderman, is neither common-sense nor sound practice. Tuberculous subjects, it would almost appear, are more readily fattened than the non-tuberculous, but gain in weight is not always a sign of improvement in other directions. The dietary must be modified according to the patient's condition. The amount and kind of food, suitable for a lean emaciated subject, may be positively harmful for him who is already too corpulent.

To enter now into the details of the dietetics of the consumptive invalid, I should like first to say that, *ceteris paribus*, the amount of food is of more importance than the kind or quality. But the amount of food which it is possible to get the patient to take is often dependent on the kind presented to him, on the manner in which it is cooked, and on the way in which it is served. An autocratic physician may so dominate his patient as to make him eat what is inexpressibly unpalatable or repugnant to him. But a physician should above all else be humane, and remember that treatment should be meted out *jucunde* as well as *tute*. Many patients have told me of the sufferings they have endured in carrying out the orders that they must eat whatever was placed before them.

Still, it is very important to rid ourselves of the notion that the average consumptive patient requires an altogether different dietary from a healthy person. All ordinary kinds of food may be taken, and can be digested. I thoroughly agree with v. Leyden in deprecating the senseless, and widely prevalent, use of artificial food products, to which I shall refer later on. These, as a rule, are absolutely unnecessary. As nutritive agents they hardly count. Some have a fair claim to be considered valuable stimulants, but, for the most part, while perhaps producing mental satisfaction, they do but little towards nourishing the body.

As an example of the dietary considered suitable for patients of the hospital class, I may here first give the diet table which is now in use at the Brompton Hospital.

FULL A DIET.

	Breakfast, 8.30 a.m.	Lunch, 11 a.m.	Dinner, 12.30 or 1 p.m.	Tea, 5 p.m.	Supper, 8 p.m.
Sunday	Bread and butter, rasher of bacon, coffee, or cocoa.	Milk, half-pint.	Cold roast beef, potatoes, beet-root (winter), salad (summer), plum pudding.	Bread and butter, tea or cocoa.	Milk, half-pint
Monday	Bread and butter, rasher of bacon, coffee, or cocoa.	Milk, half-pint.	Roast leg mutton, boiled potatoes, cabbage, sago pudding.	Bread and drip-ping, tea or cocoa.	Milk, half-pint.
Tuesday	Bread and butter, rasher of bacon, coffee, or cocoa.	Milk, half-pint.	Roast pork (winter) with sage and onions, roast lamb (summer) with mint sauce, boiled potatoes, boiled carrots, rice pudding.	Bread and butter, tea or cocoa.	Milk, half-pint.
Wednesday.	Bread and butter, rasher of bacon, tea, coffee, or cocoa.	Milk, half-pint.	Pea soup, boiled potatoes, boiled carrots, plum pudding.	Bread and butter, tea or cocoa.	Milk, half-pint.
Thursday	Bread and butter, rasher of bacon, coffee, or cocoa.	Milk, half-pint.	Roast leg mutton, boiled potatoes, boiled turnips, suet pudding with golden syrup, alternately with jam roly-poly pudding.	Bread and butter, tea or cocoa.	Milk, half-pint.
Friday	Bread and butter, rasher of bacon, coffee, or cocoa.	Milk, half-pint.	Roast beef, boiled potatoes, boiled cabbage, plain boiled rice or cornflour mould with stewed fruits.	Bread and butter, tea or cocoa.	Milk, half-pint.
Saturday	Bread and butter, rasher of bacon, coffee, or cocoa.	Milk, half pint.	Roast leg mutton, boiled potatoes, boiled turnips, semolina pudding.	Bread and drip-ping, tea or cocoa.	Milk, half-pint.

Full B Diet is the same as Full A Diet, with the addition of one rasher of bacon (breakfast), one pint of milk, ½ oz. of butter, and one egg (tea).

Light B Diet is the same as Full B Diet, with chicken, two days; fish, three days; rabbit, two days; substituted for the meat supplied at dinner.

Light A Diet is the same as Full A Diet, with chicken, two days; fish, three days; rabbit, two days; substituted for the meat supplied at dinner.

Half Diet for Children under 12—"Half" written before any diet signifies that half the quantity of meat is to be supplied.

Allowances of the various constituents, of the diets per patient:—

Mutton, pork, lamb—12 ozs. for men; 8 ozs. for women. Beef, without bone—11 ozs., men; 7 ozs., women.

Bread, 10 ozs.; butter, 1½ ozs.; potatoes, 5½ ozs.; vegetables: turnips, cabbage, &c., 5 ozs.; egg, 2 ozs.; bacon, 3 oz. rasher, man; 2 oz. rasher, woman: tea, ¼ oz.; coffee, ½ oz.; sugar, 2 ozs.; cocoa, 1½ ozs.; milk, 1½ pints.

For milk puddings, 6 ozs. milk, ½ oz rice, sago, or semolina, ⅛ oz. sugar.

For plum pudding, 2½ ozs. flour, 1 oz. suet, ¾ oz. currants, ¾ ozs. sultanas, ½ oz. sugar.

For suet pudding, 2½ ozs. flour, 1 oz. suet, 1½ ozs. treacle.

For jam roly-poly pudding, 2½ ozs, flour, 1 oz. suet, 1¾ ozs. jam.

For boiled rice, ½ oz. rice, ⅐ lb. stewed fruit (fresh fruit without stones), ¾ oz. sugar.

For cornflour mould, ½ oz. cornflour, 6 ozs. milk, ⅐ lb. stewed fruit (fresh fruit without stones), ¾ oz. sugar.

For pea soup, ¼ lb. meat, 1½ ozs. split peas, 3 ozs. vegetables (carrots and turnips), ½ oz onion.

For mint sauce, ½ oz. mint, ¾ oz. vinegar, ¼ oz. sugar.

For pork diet, sage, onions.

On Sundays, Wednesdays, and Thursdays, milk puddings, rice, sago, and semolina, to be supplied for eight patients on each Gallery, instead of the suet puddings.

Light A and B Diets:—

Chicken, 8 ozs. (9 ozs. bacon fat to be supplied with each chicken and rabbit diet); fish, 8 ozs., lemon sole, plaice, whiting, or haddock.

One rabbit to three patients, *i.e.*, about 8 ozs. per patient; ⅛ lb. onions to be supplied with each rabbit diet.

The quantities of all meats, &c., are given uncooked.

Pepper, mustard, vinegar, salt are given in suitable quantities.

Extras.—Quantities to be supplied per patient when ordered:—

Chop, 8 ozs.; stewed eels, ½ lb.; sardines, 2; minced meat, 6 ozs. (cooked). Extra butter, ½ oz. Sole. Boiled tripe, 8 ozs.; ⅛ lb. onions to each tripe diet. Haddock, ½ lb.; kipper, ½ lb., when ordered to cancel one rasher bacon.

Porridge.—2 ozs. oatmeal. When this diet is ordered, ½ oz. extra sugar and ½ pint extra milk to be supplied, and one rasher of bacon to be deducted.

For Irish stew.—¾ lb. meat, ⅛ lb. mutton, 5½ ozs. potatoes, 5 ozs. mixed vegetables.

For Scotch Broth.—Mutton as for Full Diet, ⅛ lb. onion, 10 ozs. mixed vegetables.

Meat essence, 2-oz. tin; arrowroot, 1 oz.; milk, ½ pint; egg, 2 ozs.; ale, ½ pint; stout, ½ pint. Jam, 2 ozs. per day, and ½ oz. butter deducted.

Beef tea, ½ pint.

Sherry, port, claret, champagne, brandy, whisky, gin, and rum, in such quantities as ordered.

It will be seen from this that an effort is made to give variety to the dinners. Porridge is frequently ordered for breakfast, generally in addition to one rasher of bacon. The bacon is occasionally varied with fish. The full A diet is that which is ordered in cases of the usual type. Where the appetite is good and an even larger amount of nourishment seems advisable, the full B diet is given. In cases where lighter food is indicated, one or other of the so-called light diets is prescribed.

At the Brompton Sanatorium a similar dietary is given, but instead of rigidly following a regular routine for the dinners, constant changes are made, so that the patients never know beforehand what they are going to have.

With the Brompton dietary, we may compare the dietary at one of the German sanatoriums for the poorer classes.

The following is the dietary at Rupertshain :—

1st Breakfast, 8.30 a.m.—2 cups of café-au-lait, or cocoa, or 1 pint of milk. Bread and butter.

2nd Breakfast, 10 a.m.—1½ to 2 glasses of milk, or gruel ; bread and butter. Sausage, ham, or meat sandwiches.

Dinner, 1 p.m.—Soup, meat, greens and potatoes ; small bottle of beer. Sweets on Sunday.

4 p.m.—Coffee, or pint of milk, bread and butter.

Supper, 7.30 p.m.—Soup, chop, or cutlet, sausage, herring, or cheese, potatoes ; small bottle of beer.

9 p.m.—Glass of milk.

Between the two there is no essential difference. We give the more substantial breakfast, they give the more substantial supper. At the German sanatoriums it is usual to have three fairly large meals and three small ones. We believe that our custom of having three meals and afternoon tea is better for our own countrymen. At the London Open Air Sanatorium for middle-class patients, a good breakfast is provided, consisting of porridge, ham, or bacon, eggs, meat or fish, tea or coffee, milk, bread and butter *ad lib.* At 1 o'clock a substantial dinner, consisting of soup or fish, hot joints, potatoes and greens, pudding, milk, bread and cheese, and coffee, is served. Afternoon tea is made a voluntary meal, but few, if any, miss taking it. A hot supper, similar to the dinner, is provided at 7 p.m.

At most of the German sanatoriums for the well-to-do the dietary resembles that of the hotels, with a lengthy and rather heavy dinner in the middle of the day. The following is the dietary prescribed by Professor Cornet for well-to-do patients :—

1st breakfast, 7 to 7.30 a.m.—One to two glasses of milk, cocoa or coffee, with one or two beaten-up eggs or gruel, meat or bacon, bread and butter.

2nd breakfast, 9 to 9.30 a.m.—One to two glasses of milk, or a glass of sherry or port, bread and butter.

Dinner 8 p.m.—Soup, entrée, fish, joint, venison, chicken, with vegetables, preserves and salad, pudding, cheese, butter, a glass of beer, or red wine.

4 p.m.—One to two glasses of cocoa, with one to two eggs stirred in, bread, butter, honey.

7 p.m.—Hot joint, vegetables, cold ham, roast potatoes, bread and butter, one glass of beer or wine, milk.

It is apparent, from these illustrations, that the diet which is considered suitable, both in this country and in Germany, is one in which no attempt is made to exclude articles of food which are commonly considered the heavier and more indigestible, and that, in all the diets, nitrogenous foods and fats are given abundantly. Such dietaries are arranged, however, for the average patient, while each individual case requires consideration and modification made when necessary.

It is estimated that an ordinary healthy adult requires 120 grams of proteid, 50 grams of fat, and 500 grams of carbohydrates daily, or represented in calories:

Proteid - - -	120 × 4·1 =	492 cal.
Fat - - - -	50 × 9·3 =	465 cal.
Carbohydrates - -	500 × 4·1 =	2,050 cal.
		3,007 cal.

My friend, Dr. Shrubsall, the resident medical officer at the Brompton Hospital, has kindly drawn up for me the quantities, with the caloric values, of the Brompton dietary :—

Articles of Diet.	Men.		Women.	
	Quantities in Grms.	Calories.	Quantities in Grms.	Calories.
Beef - - - -	312	404·5	198	257·5
Bread - - -	283	656·7	283	656·7
Butter - - - -	42	335·1	42	335·1
Potatoes - -	156	124	156	124
Vegetables - - -	142	40	142	40
Rice - - -	14	49	14	49
Bacon - - - -	85	640	57	426·7
Sugar - - -	57	233	57	233
Milk - - - -	852 c.c.	507	852 c c.	507
	—	2989·3	—	2629·0
Patients on full B diet get in addition :—				
Bacon - - -	85	640	57	426·7
Milk - -	568 c.c.	338	568 c.c.	338
Butter - - -	14	111·7	14	111·7
Egg - -	57	70	57	70
	—	4169·0	—	3575·4

The full B diet would therefore appear to err, by supplying a larger number of calories than is necessary. The standard minimum for men is considered to be 3,000, for women 2,000, for men, with exercise, 3,500 ; for women, 2,500.

The full A diet is that which theory and practice show to be best suited for ordinary cases.

We may compare the caloric value of the Brompton dietary with the following, from a German sanatorium :—

		Calories.
1st breakfast, 8 a.m.	1 cup café-au-lait	45·1
	1 glass milk	145·7
	Bread and biscuits	288·0
	½ oz. butter	107·0
	1½ oz. honey	131·0
2nd breakfast, 10 a.m.	2 eggs	142·0
	1 glass milk	145·7
	Bread	161·2
	½ oz. butter	107·0
Dinner, 1 p.m.	Bread	80·6
	Soup	34·8
	Fish	48·4
	Potatoes	52·6
	½ oz. butter	107·0
	Meat	37·3
	Beans	18·5
	Chicken	79·3
	Apples (stewed)	41·0
	Sugar, 2 lumps with coffee	40·0
	2 glasses wine	140·0
4 p.m.	2 glasses milk	294·0
Supper, 7 p.m.	Soup	18
	Beef	34
	Ham or tongue	600·5
	Potato salad	13
	Bread	161·4
	Stewed fruit	27
	1 glass wine	70
9 p.m.	1 glass milk	145·7
	Calories	3315·8

The researches of Goodbody, Bardswell, and Chapman on metabolism in pulmonary phthisis (*Trans. Med. Chic. Soc.*, vol. LXXXIV.) have an important bearing on the question we are now considering. They estimated the amount of nitrogen contained in the food, and compared it with the amount obtained from the urine and fæces. The conclusions at which they arrived were that patients who were much below normal weight did best when supplied with about 70 calories per kilo. per diem, but when the condition of lung is improved, and the weight is nearing normal, the dietary should be reduced to about 50 calories per kilo. per diem, when there will be a better absorption both of proteid and fat. For a patient, weighing 52 kilo., a diet supplying 59 calories per kilo. was found to produce nitrogenous equilibrium. The diet consisted of 120 grms. of proteid, 140 grms. of fat, and 300 grms. of carbohydrates. 97 per cent. of the proteid and 98 per cent. of the fat was absorbed.

The following are some of the data of the observations :—

Case 1.—A patient with pyrexia. Confined to bed. Disease fairly advanced.

Weight in Kilos.	Food in Calories per Kilo.	Amount of Nitrogen retained.	N. in Diet in Grms.	N. in Urine and Fæces.
50·76	56·9 cal.	0·32 grms.	18·58	18·26
52·44	59·7 ,,	5·91 ,,	22·00	15·09
54·36	76·2 ,,	14·27 ,,	37·20	22·93
55·16	89·4 ,,	15·65 ,,	43·38	28·35

Case 2.—Patient up. No pyrexia. Healing cavity. Below normal weight.

34·09	105·87 cal.	9·49 grms.	23·66	14·17
34·76	97·17 ,,	7·68 ,,	23·23	15·55
35·10	104·15 ,,	8·19 ,,	25·66	17·47
35·33	102·92 ,,	9·80 ,,	25·09	15·29

Case 3.—No pyrexia. Up to normal weight. Infiltration and softening both lungs. Dyspepsia and anorexia.

Weight in Kilos.	Food in Calories per Kilo.	Amount of Nitrogen retained.	N. in Diet in Grms.	N. in Urine and Fæces.
65·36	54·01 cal.	5·30 grms.	23·09	16·79
66·26	49·62 ,,	4·26 ,,	22·88	18·62
66·83	54·85 ,,	0·81 ,,	26·77	25·96
67·05	51·21 ,,	1·18 ,,	25·95	23·96

Case 4.

51·7	49·04 cal.	6·09 grms.	17·42	11·33
52·4	54·7 ,,	10·87 ,,	18·54	7·67

The diet given in Case 2 was as follows:—

Milk -	3 pints -	1014 cal.	Bread -	7 ozs. -	459·7 cal.
Meat -	7 ozs. -	257·5 ,,	Sugar -	1 oz. -	116·5 ,,
Egg - -	1 oz. -	70 ,,	Potatoes -	3 ozs. -	67·6 ,,
Bacon -	2 ozs. -	426·7 ,,	Cabbage -	3 ozs. -	24 ,,
Butter -	4 ozs. -	893·6 ,,	Rice - -	½ oz. -	49 ,,
—	—	—	Other articles.	—	189·2 ,,

This gives:—

Proteid - - - -	147·88 gr.
Fat - - - - -	212·48 ,,
Carbohydrate - -	222·25 ,,
Total Calories - -	3567·8 ,,

With this diet it will be seen the patient did not put on much weight, and more than a third of the nitrogen was retained. A smaller amount of proteid and fat would probably have given better results.

It is important to bear in mind that the caloric value of 1 grm. of proteid is equivalent to 1 grm. of carbohydrate and

to ·44 grm. of fat. We can, therefore, interchange the proteid and carbohydrate without altering the caloric value of the food.

The table following is instructive, as showing the comparative caloric values of various articles of diet, and the amount of each which would be necessary to supply 3,000 calories.

	Number of Calories in 1 Kilo.	Amount necessary to supply 3,000 Calories.
Lean beef	980	3·1 kilo.
Fat beef	3,270	0·9 ,,
Veal	1,070	2·7 ,,
Fat pork	3,130	0·9 ,,
Ham	3,790	0·8 ,,
White bread	2,290	1·3 ,,
Rice	3,420	0·8 ,,
Beans	3,030	1·0 ,,
Peas	2,950	1·0 ,,
Potatoes	660	5·0 ,,
Sugar	3,830	0·8 ,,
Milk	670	4·5 litres
Skim milk	390	7·5 ,,
Swiss cheese	3,400	0·8 kilo.
Butter	7,560	0·38 ,,
Bacon	6,170	0·5 ,,
Spinach	240	12·5 ,,
Salad	90	33 ,,
1 egg	73	41 eggs.

In individual cases, where there is emaciation, and it is difficult to get the patient to put on weight, the dietary may have to be repeatedly reconsidered. The actual caloric value of the food taken should be calculated, the number of calories,

per kilo. noted, and the relative proportions of proteids, fats, and carbohydrates recorded, and it can then be seen in what direction changes should be made.

Success in getting a patient to take a sufficient quantity of food depends, in a great measure, on attention to detail. It is not enough that the food should be of good quality and well cooked. A fastidious patient, or one with little or no appetite, must be tempted by having the food nicely served, hot and appetising. The room in which the meal is served should not be close and stuffy, as is the case in some Continental sanatoriums. Agreeable company is also important at meal times. Constant sameness of diet should be avoided. Variety is a great help to appetite. Patients often complain of all food tasting alike, and, while one cannot easily change the cook, one can vary the modes of dressing the food. Food from the grill is often a welcome change from roasts or stews. Réchauffés are never a success.

With regard to meat, there is a prevailing idea that mutton is more digestible than beef. This may be true with regard to really first-rate mutton, the genuine *pré salé*. But good mutton is now very difficult to get in this country. The man who wrote the well-known lines—

> "Proud and erect the Caledonian stood,
> Old was his mutton and his claret good,"

knew what he was talking about. Nowadays, the sheep are killed too young, and, as a rule, the mutton is tasteless and really less digestible than beef. At the Brompton Hospital by far the most popular dinners are those in which the meat is beef.

Meat should, if possible, always be well hung before it is cooked. Condiments and pickles may be allowed to assist the appetite, although "it's poor eating where the flavour of the meat lies in the cruets."

While beef and mutton will form the principal kinds of animal food, we are often glad to avail ourselves of oysters and caviare, lobsters, various kinds of fish, chicken, game, sweetbreads, &c., &c. Special mention must be made of bacon on account of its richness in fat, and its high caloric value, in addition to its palatability and easiness of digestion.

Eggs may be served in a great variety of ways, beaten up with a teaspoonful of brandy, or mixed with coffee, lightly boiled, poached, scrambled, or in omelettes. Milk, cream, and butter are of great importance, on account of their high caloric value, as supplying a large amount of nourishment in a form easy to take, and, as regards milk, at any rate, usually easily digested. In all wasted patients, milk is an almost indispensable article of diet. In a pint of milk there are 22·5 grms. of fat, so that a pint and a half of milk and an ounce of butter will together supply about 60 grms. of fat, which is more than the minimum amount necessary. The amount of milk which should be given will depend upon the state of nutrition, and upon the amount of other kinds of food taken. About a pint and a half a day may be considered as the average. The addition of citrate of soda (15 grs. to half a pint) aids the digestibility and improves the flavour. Some will take milk more readily, if flavoured with a little cognac, one or two teaspoonfuls to a tumblerful. Café-au-lait is an excellent combination of food and stimulant. Milk is often taken as a beverage at luncheon and dinner, but this is not a good plan. Milk should be considered a food, not a drink. Goats' milk and asses' milk are sometimes ordered instead of milk from the cow. The milk of the goat is rather richer in fat and lactose, and that from the ass, while still richer in lactose, is much weaker in proteid and fatty matter, and is consequently more readily digested. Mare's milk, which contains still more lactose, is well known in the fermented form under the name of koumiss. The koumiss, which is prepared in this country, is made from fermented cow's milk artificially sweetened. It has a somewhat unpleasant acid taste, but is both nourishing and stimulating, and therefore at times to be thought of.

Skimmed milk, whey, and buttermilk may be mentioned, as they can sometimes be taken when pure milk disagrees. Cream is a form in which fat is often acceptable to a patient, and may be taken with a variety of dishes, as well as with tea and coffee. What is known in Germany as *Fettmilch*, is a mixture of cream, water, and milk, with the addition of sugar of milk in the following proportions: cream, 4 ounces; water, 12 ounces; milk, 8 ounces; milk sugar, ½ ounce.

Cheese, on account of its reputed difficulty of digestion, is not so much used as a food as its high nutritive value merits. The poorer and closer kinds, such as Dutch and Parmesan, are the hardest to digest, the richer cheeses, such as Stilton and double Gloucester, are the easiest.

Farinaceous food, such as porridge, rice, arrowroot, barley, sago, lentil soup, and macaroni, should be given at one or other of the meals in addition to bread.

Vegetables should be liberally supplied. Potatoes, and at least one other vegetable, should be provided at lunch, or dinner, if not at both.

The question as to whether to give, or not to give, alcohol is one of considerable importance. Alcohol has a high caloric value, but, apart altogether from its possibly harmful properties, it is not an economical form of food. It is never a necessity in any but the last stages of the disease, but it has its uses, when it enables a patient to take his food better, and there is no reason why those who have been accustomed to take stimulants in small quantities with their meals should not continue to do so. Except when prescribed by the medical attendant, stimulants between meals should be prohibited. At sanatoriums in this country, stimulants, even at meal times, are hardly ever taken. At some sanatoriums abroad, however, it is different, and stimulants are taken very much as they are in ordinary hotel life. At the Brompton Hospital, the amount of stimulant used, never very large, has been much reduced during the last ten years. Not a quarter of the amount of port wine, and just half the amount of brandy, that were consumed ten years ago, are consumed at the present time.

It is necessary to make a passing reference to a method of treatment, which is highly thought of in France and elsewhere on the Continent, namely, treatment by means of pounded raw meat, or *viande crue*. The raw meat is given in as large quantities as the patient can be got to take it. Experiments on animals have been made, which it is said prove an increased resistance as the result of raw meat feeding. Still the method has never become popular in this country.

The method of feeding, introduced by Debove, extremely valuable as it is when it is impossible to get the patient

voluntarily to take a sufficient amount of food into his stomach, is but seldom called for in the case of phthisical patients. A soft tube is passed along the œsophagus into the stomach, and the food is introduced through a funnel. In two feeds a day, the patient gets altogether 2 quarts of milk, about ½ lb. of raw meat finely minced, and from 4 to 10 eggs. As it seldom happens that the patient cannot be fed by the stomach, feeding per rectum is rarely necessary.

In conclusion, I must add a few remarks on auxiliary or artificial foodstuffs. One scarcely knows whether to class the time-honoured remedy, cod-liver oil, under this heading or not, and whether it is a drug as well as a food, it is somewhat difficult to say. Patients, who are well fed, and who take an adequate amount of food, do not need cod-liver oil. Cod-liver oil, in its unsophisticated form, seems rapidly going out of fashion at the Brompton Hospital. For a thousand gallons per annum which were used ten years ago, scarcely a hundred are used now. But, at the same time, the mixture of malt extract and cod-liver oil has become very popular, and as much as ten tons a year is consumed, chiefly by out-patients. Personally, I think this is to be regretted. Malt extract is much cheaper than oil, but has only a third of its caloric value. The fat is a valuable addition to the diet, while the sugar of the malt extract is not. 10 grms. of cod-liver oil equal 93 calories, while 10 grms. of malt extract equal 30 calories only.

The composition of malt extract is as follows:—

Sugar	53·25
Dextrinised starch	15·02
Proteid	5·45
Ash	1·35
Water	21·9

Malt extract contains some diastase, but that has no real importance, and, apart from its usefulness as a vehicle for the oil, it need not be considered of much account as a food. Honey, which most people would prefer to malt extract, has a higher caloric value.

With regard to artificial foodstuffs, such as meat extracts, meat essences, peptones, plasmon, somatose, &c., the popular

idea is that they all represent the most highly concentrated form of nourishment. It is needless to repeat that meat essences and extracts scarcely count as nourishment at all. In the great majority of cases of phthisis, artificial foodstuffs are entirely unnecessary. Meat extracts, &c., have a value in certain cases, as stimulants, on account of the extractives they contain. We make little use of them at the Brompton Hospital. The following table by Klemperer shows the composition of several of these articles :—

——	Water.	Proteid.	Extract.	Ash.	NaCl.
Liebig - - -	17·72	20·2	38·29	22·74	—
Bovril, thick -	29·14	35·1	18·8	17·5	14·12
Bovril, fluid - -	44·42	16·9	20·32	18·32	10·7
Valentine - -	59·1	6·7	22·7	11·5	—
Fluid meat - -	25·71	30·6	30·18	13·5	10
Kemmerich's peptone.	33·3	47·13	9·97	7·73	—
Antweiler's peptone	5·91	80·4	4·08	9·61	—
Somatose - -	9·2	80	n	6·7	—
Eucasin - -	8	90	0	—	—
Nutrose - -	8	90	0	—	—

The value of these substances as foods is shown by Klemperer in the following way :—

One shilling's worth of—

Meat Juice has a caloric value of		5·9	cal.
Somatose	„	9·2	„
Liebig's Peptone	„	18·5	„
Koch's Peptone	„	31·8	„
Eggs (10)	„	710·0	„
Milk	„	3440·0	„
Sugar	„	4920·0	„

Eucasin (*Casein ammoniak*), Nutrose (*Casein natrium*), and Plasmon are on a somewhat different footing. They contain about 90 per cent. of proteid, and 10 grms. have a value 33 calories. As much as 50 grms. ($1\frac{3}{4}$ oz.) a day may be given, and occasions may arise when we may advantageously avail ourselves of them in adding to the nitrogenous intake. Dried separated milk, which can be obtained for *6d.* a lb., deserves mention as a very economical and nutritious milk product.

DIETETIC TREATMENT IN EPILEPSY.

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In a short paper upon the dietetic treatment of the paroxysmal neuroses, and more especially of epileptic fits, it is impossible and unnecessary to enter into a detailed account of the nature and causation of these affections, but it is essential at the outset to state that although migraine, periodic headaches, and epilepsy are primarily *neurosal* maladies, yet the frequency and severity of some of the paroxysmal manifestations may be controlled and modified, not only by suitable medicinal remedies, but also by the regulation of the diet, or by a combination of these methods.

In face of the known hereditary factors at work in the causation of epilepsy and migraine; in the occasional substitution of one manifestation for the other, both in the family as well as in the personal history of the patient; and in the frequency of stigmata, or signs of a neuropathic heredity presented more especially by epileptics, it is impossible to admit that the paroxysmal attacks in migraine and epilepsy are *solely* due to an accumulation of uric acid in the blood, as propounded by Haig, or to a hyperpyræmia,[1] as suggested by Hare. Neither can it be altogether accepted that all migrainous and epileptic manifestations are accountable on the basis of an auto-intoxication.

Haig's proposition that if uric acid is the cause of epileptic fits, we ought, therefore, to be able by controlling the uric acid to control the fits (as he has been able to control the uric acid headache) by diet, has not been proved to be clinically possible, although the frequency of some forms of epileptic manifestation may be modified or reduced by careful attention to the diet.

[1] Hyperpyræmia is a term implying a condition in which the contained fuel or carbonaceous matter, whatever its chemical composition, is in excess of the capacity of the organism for physiological disposal. (Hare: *The Food Factor in Disease*, 1905.)

Just as the "uric acid headache" is only one variety of paroxysmal headache, so also in epilepsy there are many clinical manifestations of the paroxysmal attacks. Researches upon the toxicity of the urine and the blood in this disease, although not completely harmonious, show that some of the characteristic outbursts may have a toxic causation; but it is quite evident that momentary attacks of *petit mal*, or frequently recurring medium fits, have not the same exciting cause as prolonged attacks of serial epilepsy or of the status epilepticus, types of the disease in which premonitory symptoms. both of a somatic and a psychical character, form an important clinical feature.

Owing to the diverse views held upon the influence of diet, as well as upon an inability to ascertain the immediate cause of the extraordinary motor explosions, which form the common clinical manifestations of epilepsy, the whole subject of the dietetic treatment of this disease is wrapped in uncertainty. Every known modification in diet has been tried with greater or less success; and the object of the present short communication is to state briefly the general results of the several dietetic formulæ, and to bring forward one which has in the author's hands been followed by considerable success.

The principle underlying the dietetic management of epileptic fits is formulated upon the view that a paroxysmal toxæmia is productive of some forms of convulsion, the toxic element being introduced by the food, formed in the digestive tract, or arising from the metabolic changes which normally take place, more particularly in the liver.

It is, however, not so much the quality of food, as its *composition*, which should guide the physician in the selection of a suitable dietary. Hence, if the chemical constitution of the ingested foodstuffs can be so regulated as to abolish, or to diminish in quantity, any proteid or other matter likely to prove injurious to the organism and to induce accumulations of toxic substances, which, in predisposed subjects, may lead to convulsions, then something has been done to modify the tendency to convulsions dietetically, and to assist the prescribed sedative, or other medicinal remedies. In addition, attention should also be paid to the *quantity* of food ingested,

for epileptics are notoriously big eaters, and, being habitually subject to constipation, are prone to overload the digestive tracts and organs. Hence small and frequently repeated meals are preferable to the large ones usually given.

It is well known that a diet rich in meat is productive of an increase in the number of epileptic convulsions, while one consisting mainly of farinaceous foodstuffs is usually accompanied by a decrease in the number of the seizures.

Likewise the vegetarian system of diet in the treatment of epilepsy has been vaunted by many, but its extended use was not found to be so satisfactory as some of its supporters contended.

The experiences of Alt (*Zeitschr. f. klin. Med.*, Vol. 53) upon the several forms of diet in epilepsy lead him to the conclusion that a diet without meat was the most satisfactory, but that neither a milk diet alone, nor a vegetable diet, was as beneficial as their combination.

It would, therefore, appear as if some method was still to be found whereby the composition of the foodstuffs could be more definitely ascertained; or whether the deprivation of a food constituent might not assist the medicinal remedies commonly employed in the treatment of the neurosis. The latter idea led to the method of "salt starvation," a dietary modification which has been largely used in the treatment of epilepsy in recent years.

"*Salt Starvation.*"—The suggestion of substituting the salts of chlorine in the dietary of epileptics by the bromide preparations is due to Toulouse and Richet, who recommended a diet in which the total quantity of sodium chloride *per diem* was limited to one or two grammes. It was thought that by diminishing the quantities of the chlorides, the bromides might be administered in smaller doses, and the risks of bromism thereby lessened. The general result of the treatment has been to show that in some cases "salt starvation" has proved a useful adjuvant to bromide medication, while in others little benefit has resulted. Other observers have shown that the dietary is of especial value in cases requiring large doses of the bromides, and in those which show a ready tendency to bromide intoxication. On the other hand, it has been contended that the danger of bromide intoxication is greater, and that, if the

diet is of any use at all, it merely acts as treatment for symptoms.

Various modifications of the original Toulouse-Richet method have been made from time to time by different investigators; and in a series of observations which the writer carried out a short time ago, the dietary recommended by Balint [1] was the one adopted. The diet chart was made up of the following ingredients:—Milk, fresh butter, eggs without salt, vegetables, fruit, household bread, and weak tea, coffee, and cocoa with sugar; no salt in the form of sodium chloride being permitted. Bromopan, or bread baked with sodium bromide, instead of sodium chloride, as recommended, was not used.

The general result of this treatment in a series of cases of confirmed epilepsy was briefly as follows [2]:— There were some cases in which the number of attacks was diminished during the continuance of the treatment, and others in which the improvement lasted after the diet had been stopped. These were cases in which the bromides were not well borne, or were even deleterious. There was reason to suppose that the minor seizures were not so satisfactorily controlled as the major, for in three cases the *petit mal* attacks were appreciably increased in frequency. The mental condition seemed to undergo some improvement. As a relief to dyspeptic symptoms it was found to be distinctly useful.

The cases, on which this method of "salt starvation" was tried, were, however, all confirmed cases of epilepsy, with marked mental deterioration, so that the trial was not conducted under very suitable conditions; hence the highly satisfactory results obtained by other observers were not established.

But it will be noticed that the dietary above mentioned comprised much more than mere deprivation of sodium chloride (hypochloruration). There is a complete elimination of meat, fish, fowl, and many of the farinacea.

From this aspect, therefore, the benefits, which the elimination of salt may be supposed to have brought about, may possibly be explained by the deprivation of other important

[1] *Neurolog. Centralblatt.*, 1903, p. 347.

[2] See also *Rev. of Neurology*, 1904, p. 793.

food ingredients ; and a further consideration of the subject and influence of diet in other nervous maladies has led the writer to test the influence of a *purin-free* diet upon the incidence of epileptic seizures.

It is only within the last few years that attention has been especially directed to the purin elements in the composition of the common foodstuffs, and much yet remains to be done in this connection ; but the works of Burian and Walker Hall upon the destination of the nitrogenous elements in food has opened up a large field in practical dietetics, and in the treatment of disease based upon a more scientific foundation than previously existed.

Influence of a Purin-free Diet in Epilepsy.—The purin bodies, or substances constructed on a base, C_5N_4, are widely distributed amonst the common foods, and it is more especially to the work of Walker Hall, to whose book, *The Purin Bodies of Foodstuffs*, that I am indebted for much information.

There are two forms of purin body, the exogenous, derived from the ingestion of food, and the endogenous, from tissue metabolism. For practical purposes, however, the former is that with which we have most concern. Purin bodies exist in all forms of meat extracts, in both the white and the red meats commonly used as food, and in large quantities in certain glands, viz., the thymus and the pancreas. They are also present to a less extent in some vegetables, and are markedly present in tea and coffee.

It was accordingly proposed to construct a dietary consisting of foodstuffs free from the presence of purin bodies, or containing as small a proportion of these substances as available analyses of the different kinds of food revealed, in the treatment of epilepsy, more especially in those cases in which bromide medication was of little or no avail.

Such a dietary may be selected from amongst the following common articles of food :—Milk, eggs, butter, cheese, rice, macaroni, tapioca, white bread, cabbage, lettuce, cauliflower, sugar, and fruit.

Of foodstuffs containing *small quantities* of purin bodies, the following may be mentioned :—Peameal, malted lentils, potatoes, and onions. In the last two the quantity is so small as to be almost negligible.

Common articles of diet which should be *avoided* in this connection are :—Tea, cocoa, and coffee, and all kinds of fish, fowl, and meat (including sweetbread). Of the meaty foods which contain only relatively small quantities of purin bodies, and which might be added to the dietary, if not rigidly enforced, may be mentioned tripe, neck of pork, and codfish.[1]

Short accounts are now given of a few cases of epilepsy treated according to the principles already laid down; the dietary consisting solely of purin-free foods, or of those containing only a minimal quantity, *e.g.*, potatoes.

The cases are all examples of idiopathic epilepsy, which had been treated, with little or no benefit, along conventional lines by means of bromide salts : they are all examples of the disease in young persons, within a few years of its onset. They were all patients seen in private practice, whose home circumstances were of a satisfactory kind.

Illustrative Cases.—1. A. B., æt. 20, was a male epileptic of 5 years' duration, without any marked family predisposition or signs of degeneration. The mental condition was good. He had been for 5 years upon bromide medication, with a steadily increasing number of *grand mal* seizures, so that the average frequency of the seizures during the last 6 months was one fit per month, and latterly one every other week.

He was put upon a *purin-free diet* and given 30 grs. of Sod. Bromid. at bedtime.

During the first month of treatment he had four fits, but has had *no attacks up to the present date, which is a period of ten months free from convulsions.*

2. C. D., æt. 30, is a female epileptic, who has had six epileptic seizures in 4 months while taking the ordinary bromide remedies. The family history shows that her father died of phthisis, and "eccentricity" was noted amongst several paternal relatives. Stigmata of degeneration were seen in well-marked facial asymmetry.

She was put upon a purin-free diet, and Sod. Bromid. gr. 25 at bedtime. During the following 2 months she had 5 slight attacks with incomplete loss of consciousness.

[1] I have taken these foods from the analyses in Walker Hall's work already mentioned.

Then followed a *period of six months, during which she had no fit of any kind.*

This patient subsequently relapsed, and the mental condition showed signs of impairment.

3. E. F., a female epileptic, æt. $5\frac{1}{2}$ years, has suffered from epileptic fits of both the *grand* and *petit mal* type for $2\frac{1}{2}$ years, the small attacks numbering sometimes as many as 20 per diem. Under the bromides she was worse, and became mentally dull and stupid. There was no hereditary history of any importance.

She was prescribed a purin-free diet, and for a time was considerably worse, but has now remained practically *free from attacks for a period of about* 18 *months*, during the whole of which time she has remained upon the diet.

4. G. H., a female, æt. 17 years, has been a victim to epileptic fits for 3 months, but she seems to have had a few attacks at intervals from 9 years of age. During the past 3 months she has been taking bromide. There are no stigmata of degeneration, nor any hereditary history, so far as known.

She was put upon a purin-free diet with 20 grs. of Sod. Bromid. at bedtime. *During the following* 10 *months she had no attacks*, with the exception of two slight seizures 5 months after treatment was started.

5. J. K., æt. 16, male, has suffered from epileptic fits for 18 months, having on an average 1 fit per week. There is a family history of convulsions, and the stigmata are a high palate and a face suggesting the "facies epileptica." He had been treated by bromides in the usual way.

He was, therefore, prescribed a purin-free diet, with 20 grs. of Sod. Bromid. at bedtime. He had 2 fits during the next fortnight, and then *remained free for* 7 *months*, when he had an attack. He remained *free for a further period of* 3 *months*, since when there has been a relapse, but the frequency is now 1 fit per month, instead of weekly as before.

I have records of other cases in which the treatment has been less successful, but in all there has been a marked improvement, both as regards the frequency and severity of the attacks during the continuance of the diet.

It is not claimed that the purin-free diet alone is the cause of the marked amelioration in the attacks, as all the patients were prescribed a dose of from 20 to 30 grains of sodium bromide at bedtime. In every instance, however, there had been a more or less prolonged course of bromide medication prior to the prescribing of the purin-free diet, with little or no improvement. Hence the deduction is obvious that *the elimination of the purin element from the dietary of epileptics is of great therapeutic assistance in the treatment of the disease;* and, as the dietary is one which may be continued for an indefinite period, there is no contra-indication to its prolonged use. It is obvious, however, that those cases in which it may be most satisfactorily prescribed are young epileptics, in the first few years of their disease, to whom the bromide salts alone have been of little or no assistance.

It remains, however, to be decided by further and more prolonged use of the purin-free foods, which types of epilepsy derive the most benefit, and those which are not likely to be improved. It may also form a test of value in determining the toxic from the non-toxic manifestations of the disease.

THE DIETETIC TREATMENT OF DYSPEPSIA AND DISEASES OF THE STOMACH.

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THERE are few common ailments that require more experience and wider knowledge in their treatment than disorders of digestion.

From infancy to old age, difficult, or imperfect digestion is liable to occur, and it is rare to find an individual who does not suffer from the malady at one period or another of life. Moreover, there are few diseases that do not present symptomatic dyspepsia at some stage of their progress.

A short treatise can only deal with the subject in a superficial way—omissions must be numerous. It is inevitable that a few general considerations must at the outset be enumerated, and that some form of classification of the causes of gastric disorder should be given.

GENERAL CONSIDERATIONS.

1. Dyspepsia mainly concerns the function of primary digestion, by which insoluble articles of food are rendered soluble and ready for absorption. At the same time, perverted metabolism is responsible for the absorption, into the general circulation, of deleterious substances, which exercise a profound effect upon the liver and other secretory organs, as well as upon the general health of the body. These secondary results of indigestion cannot be disregarded in considerations of diet.

2. The suitable dietary for the individual, and more especially for his digestive ailments, is largely governed by rational and physical considerations. Many rules of diet are purely empirical, and guided by experience of the patient and the doctor. We are not always able to explain why certain articles of food and drink are unsuitable. Two recent writers, Sir William Roberts[1] and Sir Lauder Brunton,[2] have, by experiment and observation, largely reduced the need for empirical

[1] Roberts: *Digestion and Diet*, 1897.
[2] Brunton: *Disorders of Digestion.*

treatment, and have shown us the reason why some articles of diet are prejudicial and harmful, and why others are beneficial. Empiricism is no doubt guided by experience, but the scientific treatment of disease is based on more accurate knowledge.

3. "What is one man's meat is another man's poison" is but another way of expressing the fact that healthy constitutions differ in their susceptibilities and in their digestive powers. The robust individual, as Brunton has shown, can for a time afford to disregard the physiological laws, and eat and drink, with impunity, articles of diet that would speedily disorder the digestion of the more weakly subject. A disregard of the laws of health, and intemperance in eating and drinking, bring their own punishment sooner or later. Sooner, in the case of the weakly, later, in the more robust organisations, but the result is inevitable, and the law inexorable.

4. Appetite and inclination are often valuable guides, at least in the intelligent adult. They are often the expression of the needs of the economy. The reservation is made, that they must not be blindly followed, because, in many cases of disease and in unnatural states of health, there may be a morbid craving for diet that is injurious. The experience of the dyspeptic patient as to idiosyncrasy, and as to the suitability of various forms of diet can never be ignored.

5. The various causes of dyspepsia and its different forms may occur from some imperfection in the stages that proceed in the mouth, the stomach, and the duodenum, or small intestine. Secretions in each of these portions of the alimentary canal may be deficient, or food may be imperfectly prepared, or of unsuitable quality. Symptoms of indigestion only arise when food reaches the stomach. We have, therefore, to deal with gastric and duodenal dyspepsia.

With these few introductory remarks, we may proceed to the consideration of the dietetic treatment of the various forms and phases of disordered digestion.

Starting from the standpoint of health, it may be said that *at a tender age* the secretory functions are not fully developed, and the absence of teeth means that food must be artificially prepared and almost ready for immediate absorption. The dyspepsias of infants are usually caused by an unfair burden being thrown upon the delicate organ of digestion. This

relates only to the artificial feeding of infants and young children. I cannot, in the scope of this paper, deal with the relative merits of artificial foods and humanised milk, but it may be said that it is now possible to carefully balance the amounts of casein (derived from milk) and the carbohydrate elements of diet required, and, if necessary, to give them in a semi-digested form. The gastro-enteritis, or the dyspepsia of young children, is a large subject, and it is not proposed to deal with it in the present paper.

In old age, the secretions are less active than in the adult, and the first process of preparation of food for digestion, that of mastication, is often in abeyance. When teeth are imperfect, food must be given in a finely divided state, and specially prepared. In the case of meats, or fish, they should be minced, or pounded. The stage of mastication should be imitated in the kitchen, and no food is to be taken that can be swallowed in unbroken lumps; no stringy vegetables, and nothing containing an indigestible residue. Owing to the want of elasticity of arterial walls, the tendency in the aged to hepatic congestion and engorgement of the mucous membrane of the gastro-intestinal walls is always increased in cold weather, and during the prevalence of east winds. In these circumstances, precautions as to diet must be rigidly observed. The aged do not need so large an amount of food as the healthy adult, but it is important that the physiological intervals between meals should not be exceeded, and, in some cases, a small quantity of food may be required frequently. Too long an interval between meals is to be avoided, and a sudden change from the ordinary habits of life, for instance, the substitution of a late supper for a dinner at the ordinary hour of 7.0 p.m. or 7.30 p.m. is productive of dyspepsia. At all periods of life, but more commonly in youth and in the adult, a sudden attack of dyspepsia is liable to occur.

I.—ACUTE DYSPEPSIA.

(a) "*Acute gastric catarrh*," "*Irritative dyspepsia*."
(b) "*Mechanical or food dyspepsia*."

(*a*) is characterised by acute irritation, (*b*) by pyloric spasm and gastric colic.

In *acute dyspepsia*, with gastric catarrh, some unsuitable

or irritating form of aliment has been taken. The stomach resents this, and pain, with vomiting, is the usual result. It is obvious that physical rest in the recumbent position and abstinence from food are necessary at first. In some cases, it may be wise to discontinue all food by the mouth, and to rely on rectal feeding. The best form of nutrient enema, in such cases, is 4 ozs. of milk with 1 oz. of meat essence, or 4 ozs. of milk with the yolk of one egg. The enema should be beaten up, warmed, and injected after the addition of one drachm of Benger's Liquor Pancreaticus. The two forms of enemata should be alternated and administered every four hours. When food can be retained by the mouth, it must be liquid, easy of assimilation, and of a kind calculated to lessen peristalsis (milk with lime-water, peptonised foods, but chiefly of a farinaceous character). Nitrogenous foods in solution should be given sparingly, and, on all occasions, extracts and soups made from beef should be avoided.

Acute irritation of stomach, whether caused by food or not, may sometimes form the earliest indication of ulceration of stomach. Follicular ulceration, or erosion of the mucous membrane, may lead to the prolongation of the catarrhal symptoms. Ulcer of stomach may be suspected by the severity and permanence of symptoms. If once definitely revealed by hæmatemesis, all food by the mouth should be discontinued at once, and rectal feeding by enemata, as above, every four hours, must be resorted to. In the healthy adult, enemata may be continued for three weeks, but the length of time, during which feeding by the mouth should be discontinued, must vary according to the age and strength of the patient. If the strength fails, brandy must be given in the enemata in doses of two teaspoonfuls to one tablespoonful in each injection. When food by the mouth is tolerated without vomiting, the nourishment should take the form of milk and lime water, or milk and soda water, alternated with strained broth, or meat jelly made from mutton, veal, or chicken. Beginning with half an ounce every hour or two, this form of food should be increased to 5 ozs. every 2 hours in the day and 3 hours in the night. As the acute irritation subsides, food may be increased (Benger's food, meat-jellies, bread and milk, milk puddings, peptonised farinaceous foods,

junket, &c.). The next stage is to give soft, freshly cooked articles of diet, such as pounded fish and chicken, sweetbread, tripe, and other easily digestible foods. If the diagnosis of gastric ulcer is confirmed, it will be wise to increase the solid foods by slow degrees.

Recurrences of an attack of acute dyspepsia, due to gastric ulcer, are most commonly due to a too early return to meat and solid food. All forms of food containing skins or seeds, or other irritating residue, must be permanently eliminated from the diet. I have found, by experience, that the safest and wisest plan is never to allow solid cooked meat to be taken within one year of the attack of gastric ulcer. The patient may discontinue the pounded chicken, &c., when all symptoms have disappeared, but, to avoid recurrence, it is always prudent to insist for at least one year on a diet of fish, chicken, game, or scraped raw, or lightly cooked, red meat, and the lighter forms of food, with the simplest and most easily digestible vegetables, and all soft and light puddings. In a few instances, dyspepsia is set up by the inhalation or absorption of deleterious substances, apart from the irritation of all the known poisons. Sewer gas poisoning, the inhibition of ptomaines derived from bad meat or fish, high game, &c., are not only liable to produce acute gastric irritation, but to start a permanent dyspepsia.

(*b*) *"Mechanical" or Food Dyspepsias.*—When food is imperfectly masticated (whether through defective teeth, or owing to the habit of bolting the meal), or when tough and indigestible articles of diet are swallowed (such as pork, beef-steak, crab, lobster, nuts, lumps of potato and cheese, raw apples, &c.), they may not necessarily cause acute irritation of the gastric mucous membrane, but if they are so imperfectly prepared, or broken up, that they are incapable of being dissolved, or thoroughly acted on by the gastric juice, they are unable to pass through the pyloric orifice of the stomach. Acute spasm of the pylorus is set up, and the exaggerated peristaltic movements induced, are liable to produce severe colicky pain. If the offending cause can be removed by an emetic, or by a dose of castor oil, the symptoms will rapidly subside, and again the dietetic treatment must depend on the amount of pain and irritation, and temporary abstinence from food is the remedy. No definite rule of diet can be laid

down, but it is obvious that when food can be taken, liquid food, as in the case of gastric catarrh, must first be given. Exact directions are not needed, as the whole treatment is governed by rational and common-sense considerations.

In some cases, an excess of one form of diet is liable to produce a very sudden dyspepsia. Too much potato, bread, tea, alcohol, are responsible for an attack of indigestion. It will be more convenient to deal with these cases under the next group, but I mention them in this place, because they come under the category of food dyspepsias.

2.—CHRONIC DYSPEPSIA—OF FUNCTIONAL ORIGIN.

(a) *Flatulent Dyspepsia—Acid Dyspepsia.*—These are terms which are sometimes used to describe a very large class of cases. They are derived from two common symptoms, but they have no pathological significance, and are imperfect because flatulence and acidity are common to almost every class of chronic gastric disorder.

In a previously healthy person, these symptoms are the expression of a disorder of gastric and other secretions. They are brought about by imperfect mastication and preparation of food for the processes of gastric digestion, by irregularity of habits and meals, by eating too quickly (bolting the food), by an excess of some particular article of diet (as mentioned above), by imperfect cooking, by the ingestion of very hot fluids, or irritants, which have injured the gastric mucous membrane, by want of exercise and fresh air, and a sedentary life, or by any cause that tends to produce physical or mental exhaustion.

All these questions must be carefully enquired into, the routine of life regulated, the teeth carefully attended to, and the manifest errors of habit and diet corrected. In spite of this advice, it is not uncommon to find the symptoms continuing, and, apart from the aid that can be given by medicinal treatment, the diet must be regulated in the direction of prescribing food that can be easily assimilated, and by denying the patient all articles of food and drink that tend to hinder and retard gastric secretion, or to produce irritation, fermentation, or decomposition. It is convenient at this place to give a diet list appropriate for such cases, but it must

be remembered that such a list is suitable for almost every class of case of chronic disorder of gastric secretion, whether due to functional or organic disease.

GENERAL DIRECTIONS FOR THE DYSPEPTIC.

Food should be taken at regular intervals, 4 meals may be taken per diem and no food, or drink, may be taken between meals, or after meals. The meals should be breakfast, lunch, tea and dinner. At least 4 hours should elapse between each meal with the single exception that dinner, or supper, may be taken 3 hours after a light afternoon tea.

At BREAKFAST—8 a.m. to 9 a.m.—the following may be taken. Lightly cooked bacon, eggs (if they suit) lightly boiled or poached, omelette, buttered eggs, game hot or cold, freshly cooked potted meat.

Stale bread, 24 hours old, toast, butter sparingly. Tea (China tea by preference) freshly infused for not more than 5 minutes and well diluted, or coffee, with milk. Cocoa infused from the nibs. None of the ordinary preparations of cocoa. Some allow cocoatina in suitable cases.

LUNCH, at 12.30 to 1.30 p.m. A light meal.

Fish.—Any of the white varieties of fish, boiled by preference. If fried, the skin must not be eaten. These are whiting, sole, lemon sole, cod, turbot, smelts, halibut, eels, and others. Oysters are easy of digestion.

Sauces. — Only simple melted butter flavoured with anchovy.

Meats.—Only freshly cooked meat, mutton by preference. Chicken, rabbit (if it suits), game, sweetbread, tripe, calves' foot, &c.

Vegetables.—Potatoes, sparingly and grated or rubbed through a sieve, not whole or mashed. Cauliflower. The leaves of cabbage, bunch greens. Vegetable marrow. Sea-kale. Asparagus. Cooked celery. Spanish onions. Spinach. Turnip tops. Scotch kale.

Salad.—Watercress. Mustard and cress. Endive. Leaf of lettuce. No vinegar or salad dressing.

Sweets.—Any light milk pudding, made from rice, flaked rice, ground rice, sago (large or small), semolina, and custard pudding, caramel, or sponge cake, or cup puddings.

Fruit.—Cooked apples.

Cheese.—Very sparingly.

Beverages.—Stimulants generally injure digestion, and, if possible, the patient is better without wines. The least injurious are Carlowitch, or a light but not acid claret. Sometimes a good Moselle, or a white wine free from acidity agrees well, or a small quantity of spirit, one to two tablespoonfuls well diluted. No malt liquors, or effervescing waters. Fluid should be taken only at the close of a meal or after a meal. Too much dilution of the gastric juice during the meal hinders the activity of digestion.

TEA—at 3.30 to 5.0—freshly infused, as at breakfast, and very weak, and not exceeding half a pint in quantity. Sometimes, when desirable to give milk, the tea may be infused with boiling milk instead of boiling water, as the late Sir A. Clark suggested. Bread, or toast and butter. Sponge or Madeira cake.

DINNER, at 7 to 7.30, but not later than 8 p.m. Food as at lunch, but the meal may be more substantial. A few tablespoonfuls of clear soup will do no harm, unless there is flatulence. No thick soups should be taken. At *dessert*, bananas are often easy of digestion. No raw apples, or pears, grapes or plums. In some cases a ripe pear, peach, or nectarine, or grapes do not disagree.

AVOIDANCES IN THE DIET OF DYSPEPTICS.

In the diet lists of the late Sir A. Clark, these words invariably occurred in his advice to dyspeptics:

"*Avoid soups, sauces, pickles, spices, curries, cured meats of all sorts, tinned or otherwise preserved foods, salted, smoked, dried provisions, pie, pastry, cheese, creams, ice, jams, dried fruits, nuts, salads, alcoholic beverages (unless specially prescribed), strong tea, and strong coffee. Much fluid of any sort and all sweet, sour, or effervescent beverages.*"

Sometimes the words "twice cooked" or "réchauffé dishes" also occurred.

This list might be further enlarged, but is so admirable as a general direction to the dyspeptic, that I venture to give it. It seems scarcely necessary to add that all tough and indigestible articles of diet are prohibited, such as pork, beef steak, sausages,

kidneys, crab, lobster, shell fish, &c., except oysters. The fluid diet should not exceed 2½ pints in amount. No drinks should be taken at the commencement of a meal, and whenever food, or fluid, remains in the stomach, owing to undue distension, or to dilatation, by far the best plan is to take half a pint of hot water, or other fluid, about one hour before meals, and drink only a few ounces (not exceeding five ounces) at the close of, or after a meal. It is impossible to mention every article of diet that is appropriate, and only general rules can be laid down. One patient will state that cabbage produces violent flatulence. Another will describe discomfort after turnip tops or potatoes. Some have a strong idiosyncrasy against fish in any form. As a rule, the patient has learned by experience these limitations.

3.—ATONIC DYSPEPSIA.

The cases included under this term suffer from disorders of digestion, owing to a lack of gastric secretion. After debilitating diseases, and in all anæmic states, the nutrition of brain and nervous system is imperfect, as also is that of the gastric mucous membrane and the peptic glands. Both quality and quantity of blood may be deficient. This form of dyspepsia must be treated with generous diet and with food at frequent intervals, and, while care should be taken to afford food of the highest nutritive value and calculated to throw the least possible burden on digestion, the rules of diet just laid down need not be adhered to with quite the same rigidity. At the same time the main cause is defective and insufficient secretion. No food or drink must be taken that hinders secretion of gastric juice.

As in the previous case, strong coffee and tea, wines, beef-teas, and substances containing saline bases that neutralise the hydrochloric acid poured out in peptic secretion, should be avoided. The dietary is somewhat the same, but the reason for its ingestion is different. In case of profound atony after fever, and in cases of hæmorrhage, the simplest and blandest form of nutriment must be administered. I refer the reader to Sir William Roberts' work[1] and elaborate experiments on the influence upon gastric secretion produced

[1] Roberts: *Digestion and Diet*, 1897.

by certain foods and drinks, and to the work of Wilson Fox.[1]

4.—CEREBRAL AND NERVOUS DYSPEPSIA.

The digestive function is frequently disordered through an *exhaustion*, or *aberration*, of its nervous mechanisms.

Gastric secretion depends upon the efficient performance of the reflex nervous mechanisms.

(*a*) *Exhaustion of Brain* (brain fag) is responsible for the dyspepsias of busy city men, and of those who have suffered from anxiety, or worry, or the strain of life.

Again, the rules of diet previously laid down are useful. Secretion is imperfectly performed. The nervous system is at fault, and, in this case, it is not only the gastric secretion that suffers, but the salivary, the pancreatic and the hepatic secretions share in the deficiency. The avoidances, mentioned in the above diet list, must be strictly insisted upon. The cases vary, for the diminution of the activity of the secretory organs is not always uniform, and, occasionally, the feeble hepatic, or pancreatic, secretion is of greater importance than the gastric. In such a case, care must be taken to diminish the carbohydrate elements of the diet, or to prescribe with them the ferments of pancreatic digestion, or to give food in a semi-digested form.

Rest in the recumbent position, for half an hour to one hour, before a substantial meal is often a great aid to digestion.

(*b*) *Aberration of the nervous mechanism of secretion* occurs in some neurotic persons, and, instead of a diminution of secretion, there may be poured out an excess of gastric juice, and the patient may suffer from acidity, heartburn, or pyrosis, and flatulence. Such cases must be carefully distinguished from conditions where a chronic gastric ulcer (frequently in the pyloric region) produces excessive pyrosis and great irritation, with the accompaniment of unusual nervous symptoms. I have seen such cases with nervous accompaniments, almost amounting to epileptic seizures, so violent and persistent that attention has been diverted from the true cause of the malady. Leaving such obscure cases out of consideration, there is no doubt that the nervous dyspeptic presents great difficulties in treatment. Apart from the irregular secretions,

[1] Wilson Fox: *Diagnosis and Treatment of Dyspepsia*, p. 103.

there is often found a condition of atony of the gastric walls, with considerable distension of stomach. I do not use the word dilatation, because it is not an appropriate term, unless the distension is permanent. The stomach is a very distensible organ, and is capable of great variations in size. The stomach of a neurotic dyspeptic is usually distended, and, more rarely, dilated.

In the latter case, all food gives a feeling of weight and discomfort. In this and other cases of dilated stomach, when operation is inadmissible, it is better to give light and nutritious diet, without meat (pounded chicken and rabbit, sweetbread, tripe, and such like soft and easily digestible foods, bread and milk, Benger's food, light milk and other puddings). Liquid foods and effervescing waters increase discomfort mechanically, and cause flatulence.

The fluids should be taken one hour before a meal, and half a pint of hot water, or hot milk, is preferable. If nutrition is good, hot water only should be taken at the close of the meal. Not more than a claret glass of fluid, or wine, may be taken.[1] In cases of excessive pyrosis of nervous origin, the nitrogenous food should be reduced. Liquid foods are to be avoided. The patient is better without stimulants, and excess of carbohydrate food, and sugar are to be avoided.

5.—HEPATIC AND DUODENAL DYSPEPSIA.

(a) *Bilious Dyspepsia.*—There is no doubt that, apart from duodenal catarrh, which may produce hepatic disturbance in any individual, and consequent disorders of digestion, some people are constitutionally liable to hepatic disorders, and we define this disposition as due to a hepatic diathesis. More correctly, we should say that there is an inherited tendency to deficient hepatic secretion. In most of such cases of dyspepsia the source of hepatic disorder is the ingestion of too large an amount of food, and especially an excess of the nitrogenous elements. If gastric digestion has not sufficiently dealt with the nitrogenous foods, too much is left to the duodenal secretions. There is no doubt that the hepatic secretion has an influence in producing some destructive metabolism of the albuminoid constituents of proteid matter.[2] When there is a

[1] Habershon: *Diseases of the Abdomen*, 4th ed., 1888, p. 272.

[2] Fothergill: *Indigestion and Biliousness*, 1881.

deficiency of bile, the normal peptones and other by-products of digestion are absorbed into the general circulation, and produce certain deleterious results.

The symptoms of biliousness must be due to one of two causes. Either the normal products of gastric digestion act (as Fothergill[1] states) as poisons, when directly absorbed without the influence of biliary metamorphosis, or, in the absence of a sufficient secretion of bile, certain decompositions of nitrogenous products of digestion must occur with the absorption of substances and by-products which virtually act as poisons when they reach the general circulation.

While the recommendations for diet above described may be adhered to, care should be taken to diminish the ingestion of nitrogenous food. A purely carbohydrate diet is not advisable, as hepatic secretion is thereby reduced considerably. A moderate ingestion of meat foods is necessary, but red or butcher's meat should be avoided. The term excess of food is a purely relative matter. To some extent, when hard exercise is taken in a bilious, or in a gouty, subject, a much larger amount of nitrogenous food may be taken with impunity than when the life and occupation are sedentary. I have known a gouty man and a highly bilious person able to take plenty of red meat and to drink beer at a shooting lunch when the diet has, so to speak, been earned by hard muscular exercise.

(*b*) *Duodenal Dyspepsia.*—When, owing to gastro-duodenal catarrh, or to the hepatic disorder, caused by excess of food, &c., symptoms of dyspepsia occur, we cannot leave out of account the profound influence of the pancreatic secretion. The solution of proteids is completed by the alkaline pancreatic secretion, but it is a matter of extreme difficulty to differentiate the share taken by the peptic and pancreatic ferments. When amylaceous foods are ill-digested, and when the symptoms are most marked some two or three hours after food, we are accustomed to regard the pancreatic secretion as at fault. Care must then be taken to diminish the carbohydrate elements of diet, and to supply, in addition, some ferments, such as zymine, trypsin, taka-diastase, or malt extract, which artificially supply the deficiency.

[1] *Op. cit.*

6.—DYSPEPSIA DUE TO THE CHARACTER OF THE BLOOD.

Gouty and Rheumatic Dyspepsia.—As the subject is to be dealt with in another paper, it will not be necessary to allude to the dietary appropriate to such conditions.

Renal Disease.—In the scope of the present paper it is impossible to deal with the digestive disorders and accompaniments.

7.—SYMPTOMATIC DYSPEPSIA.

(*a*) *Deficient Gastric Secretion.*—Chronic gastric catarrh is an accompaniment of many chronic diseases, and eventually leads to profound changes in the gastric walls and mucous membrane. These proceed in the direction of hypertrophy and atrophy, and the latter is the more common in wasting diseases. An elimination of many of the gastric peptic glands ensues, and, when the stomach is invaded by a malignant growth, it is obvious that a similar result is produced. The secretions are deficient, and the dietary is based on purely rational considerations. Food must be easy of assimilation and absorption, and it is often necessary to give pepsin and the pancreatic ferments by the mouth.

(*b*) *Chronic Engorgement and Congestion of the Gastric and Intestinal Vessels.*—This is the cause of the dyspepsias that occur in cases of chronic alcoholism (hepatic congestion and cirrhosis of liver), morbus cordis, emphysema, and all pulmonary diseases, in which the right side of the heart becomes dilated, and the systemic venous circulation embarrassed. In all such cases, the secretions are abnormal, or deficient, and there is usually an excess of mucus secreted so that food is frequently wrapped in a mucous envelope, and imperfectly subjected to the gastric and other secretions. Food must be simple and easily digestible, and should be given frequently and in small quantities, at least in those complaints in which gastric distension would hinder the free movements of the diaphragm.

(*c*) Some diseases, amongst which the most prominent are due to tuberculosis of lungs and other organs, are said to produce certain dycrasias, or constitutional symptoms, which are, in all probability, due to the absorption of toxins. In pulmonary tuberculosis, digestive ailments are characteristic,

and are not only the precursor of the active stages of the lung disease, but mask the incipient pulmonary disorder. Atony of the gastric and intestinal walls, deficient gastric, hepatic and pancreatic secretion, bringing in their train feeble digestive power and imperfect assimilation of carbohydrates and fats, are the most potent causes of dyspepsia.

Latham (in one of his classical essays) described how frequently an early pulmonary tuberculosis was overlooked, and the disease pronounced to be "all stomach," when a more careful examination would have revealed the true cause of the tendency to dyspepsia.

When a chronic condition of this sort prevails, especially in the young, and after elimination of all the ordinary causes of indigestion, tuberculosis should be suspected. Even the great master of auscultation and percussion (Laënnec), who taught us all that we know of the examination of the chest, himself died of phthisis, in 1826, after suffering for years from dyspepsia and gastric disorders, the malady of the lungs having been entirely overlooked.

A diet, easily assimilated, a careful regulation of its proteid and carbohydrate elements, and the administration of the gastric and pancreatic ferments, are essential to the treatment. One form of diet has been largely tried in cases of pulmonary tuberculosis, and with a considerable measure of success. The administration of scraped raw meat, from the undercut of the sirloin of beef, or from the finer portions of raw meat, has proved a most nutritious and easily digestible form of nutriment. It may be administered in the form of bread and butter sandwiches, and milk and eggs may be added to the diet.

In dealing with such a wide subject as dyspepsia, it is evident that many cases come under more than one category. Apart from organic diseases, several causes may coincide to produce aberration of the functions of digestion. In a large proportion, the cases must be dealt with on their individual merits, and, though a general classification may be made and general rules laid down, it is impossible to place upon paper a method of dietetic treatment suitable for every case.

DIET IN INTESTINAL DISORDERS AND DISEASES.

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THIS subject would be a comparatively easy one if the action of the human intestine in sickness and in health were the same in all individuals. Unfortunately this is not the case. The intestinal functions vary in different people from the time of birth; they are altered by the individual habits, and by diseases, and, consequently, are an unknown quantity in the case of every new patient. Recognising this fact, I cannot pretend to lay down any dietetic rules which will suit any individual case, and far less all cases. My object will be simply to indicate certain general lines of diet, preventive as well as curative, which may be borne in mind. Certain typical conditions which call for treatment, and which are common in practice, will be considered under the following headings: I., Inflammatory Affections; II., Ulcerative Affections; III., Nervous or Neurotic Affections; IV., Chronic Intestinal Indigestion; and V., Chronic Constipation.

I.—*Inflammatory Affections.*—In the acute stage, the best plan is to withhold all food for a time. Water may be given freely to drink, either plain or rendered sedative by aeration, barley, alkalies, &c. When the acute symptoms have subsided, and in chronic forms of inflammation the aim should be to give food of such a quality, and so prepared, as to cause the least amount of disburbance in the bowel. It must also be remembered that, in these conditions, intestinal secretion is much diminished, and that consequently intestinal digestion is imperfectly carried out. Those foods which can be digested in the stomach, or which have been predigested before administration, are the most suitable. Where good cooking is available, freshly prepared beef-tea, and mutton, chicken, or veal soup will be found beneficial. These should be well diluted, and given in small quantities, and at frequent intervals. If given in concentrated form, they are apt to induce diarrhœa

When the cooking is not to be depended upon, one falls back on some of the beef essences, or jellies, on the market, but these, although credited with the most potent virtues, are far inferior to the home-made substances. Whey, or skimmed milk, to which some digesting agent, such as Fairchild's peptonising powder, has been added, may also be used. Starchy foods, which have been wholly converted, may be safely given, as the work thrown on the intestine will be only that of absorption. Fatty foods are better omitted. As improvement takes place, the fluid foods can be replaced by solid ones of the same composition, and in increasing quantity.

II. *Ulcerative Affections.*—Ulceration may be present in the bowel, affecting usually the lower part of the small intestine, the cæcum, and the colon. The chief varieties are associated with typhoid fever, dysentery, and tuberculosis. Enteric fever is discussed in a separate article, and dysentery is not a common affection in this country, so that we shall confine our remarks to ulceration of the bowels of tuberculous origin.

Tuberculous ulceration may be primary, that is to say, the only manifestation of the disease may be in the intestine, or it may be secondary to disease in other parts, as in pulmonary phthisis. In the latter case, the bowel trouble may be the most active and troublesome part of the disease, and may materially hasten a fatal termination. It would naturally be supposed that diarrhœa, with mucus and blood in the stools, was a common symptom, but many cases run their course without any symptoms of that nature, and the lesions are only discovered on post-mortem examination. Drugs have comparatively little influence on the diarrhœa and other symptoms. Diet, on the other hand, has a most powerful effect in allaying acute symptoms, so much so, that one is led to believe that an unsuitable diet is, in many cases, the real cause of the active manifestations of the disease. Similarly, one is led to believe that, in those cases in which the symptoms are absent, a suitable diet, either by accident or design, has been taken. At the onset of diarrhœa, with later pain, melæna, and mucous stools, a diet of milk and puddings and "slops" would generally appear to be indicated. Experience shows that such a diet is the worst possible in this affection. Milk,

bread, and all farinaceous foods are apt to ferment in the bowel, and the fermentation thus established causes such irritation in the ulcerated surfaces, that active symptoms develop. Provided that there is no stomach trouble, and gastric digestion is not usually interfered with in such cases, the patient may be put at once on a diet of animal food, on the following lines :—

Breakfast :—Fresh fish ; tongue, freshly boiled or preserved ; white of eggs ; one cup of weak cocoa, with one ounce of milk. Two small pieces of dry crisp toast.

Lunch.—Fish, chicken, sweetbread, hot or cold beef or mutton, plainly cooked, chops, steaks, breakfast or dinner biscuits (small quantity). One glass of good claret.

Dinner.—As lunch.

As the appetite is usually good in these patients, three meals a day appear to be better than frequent small meals. If, on the other hand, the appetite and digestion are not good, then smaller and more frequent meals are beneficial. If solid meals seem to be inadvisable, and are not appreciated by the patient, soups (meat or fish), raw meat juice, or sandwiches made with scraped raw meat, may be given. Even in the case of young children, one frequently finds that a meat diet, in one or other of the above forms, is taken with relish, and marked benefit. When the acute symptoms have been relieved, a return to a more mixed diet is made gradually, fats being added first of all, and, later, carbohydrates in moderation.

III. *Nervous or Neurotic Affections.*—The complaints of the intestinal neurote are many and various, some of them being accompanied by objective signs, and others being impossible of confirmation. Owing to the presence of pain, or flatulence, or constipation, or discomfort of some sort, the patient has been led to try various dietetic "cures," which may have been recommended on medical authority, or may have been culled from some lay work. He reports that he has tried all of them, and is no better. When, therefore, we find that he has been on a pure meat diet, and again on a meat-free diet, on a course of milk only, and again on nothing but vegetables and fruit, that he has had at one time fluid meals only, and at another no fluids at meals, it is rather

difficult to devise for him that fresh dietary which he longs for, and believes will at last bring peace within. As a matter of fact, he probably has not stuck very closely to any one diet, being swayed by his appetite, which is sometimes ravenous, leading him to eat too much, and, at another time absent, so that he does not eat enough. We have to preach to him a gospel of moderation and a mixed diet. He must be assured, even if he cannot be convinced, that his symptoms are not caused by plain, ordinary food. He must be informed that the alarming symptoms, which he assumes to have been directly induced by a cup of tea, or a mutton chop, or a dry biscuit, bear absolutely no relation to such a cause. At the same time, we must not overlook the special idiosyncrasies which such patients have, or have developed, for certain articles of diet, just as they have for medicines. When a neurotic patient of this type is isolated and kept at rest in bed, it is wonderful how quickly the intestinal symptoms vanish, and how thoroughly the full diet of a nursing home is appreciated. In the case of the intestinal neuroses, we do not recommend any special dietary, but simple, plain, nourishing fare, at regular intervals, and in moderation.

IV. *Chronic Intestinal Indigestion.*—This may not be a pathological entity, but it is a common and troublesome complaint, at all ages and in all ranks of society. It is often met with in patients, who assure us that they have never suffered from indigestion in their lives. The explanation of this statement is that, to the lay mind, indigestion is directly associated with the taking of food, with pain or discomfort, flatulence or acidity, coming on soon after a meal. Some people are blessed—or cursed—with a stomach, which seems capable of taking a large quantity of food, of all degrees of digestibility, and of passing it on to the bowel without difficulty and without disturbance. But, in such individuals, the hour of reckoning is only delayed, and the intestinal digestion is apt to be upset by the strain put upon it. The symptoms of this form of indigestion are very varied. There is a great tendency to intestinal fermentation, or putrefaction, with distension of the bowel and offensive stools. Colicky pains, or pain in the back, or an uncomfortable feeling of distension may be present. Diarrhœa, or constipation, or

alternating attacks of these conditions may occur, and wasting is often the most striking symptom.

In the treatment of such cases we must first enquire carefully into the habits of the patient. Numerous cases are to be traced to imperfect mastication of the food. Many people, who ought to know better, bolt down their food with indecent haste. In such cases, given a good gastric digestion, the result will probably be intestinal indigestion. The diagnosis cannot be made from the patient's own statement, for he will probably deny that he eats too quickly, but from enquiry of the friends, or better, from personal observation of the patient at dinner, the cause of the trouble may be learned, and the remedy is simple. A more frequent source of imperfect mastication of the food is to be found in the absence, or decay, of the molar teeth. With the best intention in the world one cannot chew a beefsteak thoroughly with the front teeth. Consequently hard and tough substances are imperfectly triturated, and trouble follows in the later stages of digestion. Examples of this condition are seen in hundreds at the London hospitals daily, but they occur in all classes of society. In other cases, the quantity and quality of the food must be carefully enquired into, and regulated according to physiological principles. It is not generally recognised that many individuals, who systematically eat too much, do not suffer from gastric indigestion, or that a second helping of salmon and cucumber may not cause trouble, until it is pursuing its course through the intestine on the following day. Some people—I had almost written men, but must include the other sex—are so proud of their gastric digestion, and so ignorant of their intestinal digestion, that they take a horrible pleasure in showing their ability to consume Welsh rarebit, or pickled pork, at an advanced hour of the evening. Such cases are to be treated on ordinary, and not on special dietetic, lines.

In children, intestinal indigestion is more common than the purely gastric form, the latter showing itself, as a rule, in acute attacks, while the former is apt to be a chronic affection. In the child, assimilation is often interfered with, and wasting, languor, depression, and diarrhœa are apt to be present. The first point to be recognised is that starvation does not induce

chronic intestinal indigestion. This fact is not, as a rule, appreciated in the domestic circles where the trouble is found. The usual course of events is as follows:—A child, with a healthy appetite, such as it is a pleasure to witness, is allowed too full a diet, with an excess of farinaceous foods and sugar. This excess of carbohydrate material is often given in such fluid form that the teeth are not used, the food is swallowed rapidly, and goes down so easily that much larger quantities are consumed, than if thorough mastication had been necessary. By-and-by symptoms of intestinal indigestion appear. The child looks pale, and begins to lose flesh. A course of feeding up is at once begun, and beef juices, patent foods, cream, &c., are added to the already over full dietary. Then a friend comes along, who perhaps has a surgical qualification, and he prescribes Parrish's syrup for the anæmia, and cod-liver oil for the wasting. These usually prove to be the last straw, and lead to a general breakdown. So low may the patient have been reduced by the dietetic treatment that a diagnosis of tabes mesenterica is frequently made. The course of treatment to be adopted is to give the overtaxed intestine as much rest as possible. Peptonised milk or whey, and freshly made mutton, or chicken, or veal soup are to be given in small quantities every two or three hours. Even here a word of warning must be given to the cook to the effect that she is not to make the soup as "strong" as possible, for she is probably imbued with the idea that the food to be strengthening must be strong itself. When the intestinal rest has led to the recovery of appetite—for, on the breakdown, all appetite is usually lost—solids may be begun in the form of fish, chicken, or mutton, plainly cooked, with a little breadcrumb, or bread sauce. After toleration for these has been established, some carbohydrates may be added to the dietary, toast, milk pudding, and plain biscuit. It is extremely important that these should be given in such a form as to ensure thorough mastication, which is a great preventive of over-eating. Last of all, the stage of fatty foods is reached, butter, yolk of eggs, cream, and cod-liver oil, and the building up will then go on rapidly. The process has been described in a few lines, but it is often a very slow one, varying in duration according to the length of time the symptoms have been present. If small meals at frequent

intervals are ordered, and the sequence of foods, first proteids, then carbohydrates, and lastly fats, is observed, the result will usually be gratifying to all parties.

We go a step further back than childhood, and find that chronic intestinal indigestion is not rare in infancy. Again, diet is the chief factor in its production. The scientific feeding of infants is, according to their own statements, largely in the hands of the manufacturing chemists, and their science has not yet reached the intestine, but stops short at the stomach. They make foods which will "stay down" in the stomach—as to what happens afterwards, they are not responsible. The result is that, at frequent intervals during the day and night, the infant is deluged with a fluid mass of converted starch and sugar, which ferments and putrefies in the intestine. The signs are but too obvious in the shape of a distended abdomen, colicky pains, and loose and offensive motions. I do not say that the above is the sole cause of intestinal indigestion in infants, but it is one of the commonest. Other errors of dieting or of diet may produce the same trouble, and the treatment is identical in all cases, namely, the adoption of physiological feeding with, so far as possible, rest to the intestine.[1]

V. *Chronic Constipation.*—Under the conditions of life in the present day, there are many causes at work tending to produce that chronic, or habitual, constipation which is so common. One of these factors is the diet, and the correction of a faulty dietary may in some cases lead to the lessening, or the cure, of constipation. With some, the fault is that the amount of fluid taken during the day is too small. This, I believe, applies more particularly to women. A cup of coffee at breakfast, a mouthful of water at lunch, two small cups of tea in the afternoon, and a mouthful of water, or a glass of wine, at dinner may represent their whole fluid intake during 24 hours. This is not sufficient. The glandular structures of the body require more than this for their healthy action, and the intestinal secretions can only be kept in good order by means of a plentiful supply of water. Moreover, if the body is insufficiently supplied with water, the tendency is for the fluid present in the intestinal contents to be completely absorbed in the colon, so that only inspissated fæcal

[1] *Vide* article on "Infantile Diarrhœa," THE PRACTITIONER, October, 1905.

matter remains. This also leads to constipation. In such cases a pint, or a pint and a half, of water should be drunk daily, and preferably apart from meal times. With others, the fault is that too much fluid is taken, especially at meal times. This, I believe, applies more particularly to men. If the chief fluid consumed is beer, as in the case of the working classes, constipation does not usually result, as beer has a distinctly aperient effect. With wine, it is not so, and many a man consumes a bottle of wine a day at meals, and as much fluid, in the form of whisky and soda, apart from meals, in addition to other fluids. While it is very necessary to flush out the various secretory organs, it is not beneficial to flood them with fluid, and, in some cases, it will be found that the intestinal functions are improved by diminishing the intake of fluid. The dietary of many is too refined, that is to say, there is not enough of coarse, fibrous, and indigestible matter in it. Intestinal peristalsis is weakened, when there is no solid residue in the bowel to call it into action. The fluid, non-irritating, contents of the small intestine give no stimulus when they reach the colon, and remain there as soft pultaceous masses. Hence the advantage, in many cases of chronic constipation, of taking foods which contain irritating particles, such as porridge, figs, &c., or which contain a large amount of indigestible residue, such as salads, green vegetables, tomatoes, and raw apples. Many constipated individuals carefully peel all the fruit they eat, whereas the nightly aperient might be omitted, if they consumed the skins of apples, pears, tomatoes, &c. Provided that the digestion is good, a diet containing a considerable amount of vegetables in the form of cabbage, sprouts, spinach, &c., will tend to relieve constipation, partly from the indigestible material present, and partly from the bulk of fæces produced. In a lean meat dietary, on the other hand, there will be little residue and little irritating matter. Fats and oils have a lubricating action in the intestine, and prevent the inspissation of fæces, so that plenty of beef or mutton fat, salad oil, and nuts may serve as well as a dinner pill in certain cases of chronic constipation.

DIET IN SKIN DISEASES.

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Almost the only thing in the nature of a general principle that we have to guide us in the matter of diet is that each man must be a law unto himself. But in regard to special diseased conditions a number of empirical data have been collected. In regard to the skin, for example, it is well known that there are substances, notably shellfish and certain fruits and vegetables such as strawberries and parsley, that in susceptible persons give rise to eruptions of various kinds on the skin. It is also known that food and alcoholic drink cause flushing, especially in certain regions, as the face. These are matters of common observation, and they prove that food has an effect on the healthy skin. It may therefore be inferred that it has an effect on the diseased skin. This may appear to be labouring a point that is obvious, but as the prevailing wind of dermatological doctrine in these days tends to sweep aside the influence of diet as a negligible quantity, it may be well to recall these simple but important facts. When, however, we attempt to apply the data we possess to the treatment of cutaneous diseases, their insufficiency at once becomes manifest, and our ignorance of the relations between the pathology of the skin and food is painfully borne in upon us.

VIEWS OF REPRESENTATIVE AUTHORITIES.

A rapid survey of the very scanty literature that exists on the subject will show the position of the question. I have chosen only authorities who may be taken to represent various shades of expert opinion.

Brocq[1] points out that the practice of dermatologists in regard to diet varies very widely, some forbidding many kinds of food without any discrimination to patients with the slightest

[1] *Traitement des Maladies de la Peau*, Paris, 1890.

eruption, while others—among them men of the highest authority—let them eat what they will. In estimating the action of food, according to him, its remote as well as its immediate effects must be taken into account. When food acts on the skin a few minutes or some hours after it is taken, it does so either after passing through the circulation, as is the case with most medicaments, or by causing disturbance of the stomach and intestine, which reacts on the whole economy.

In regard to remote action, Brocq thinks that in certain cases eczema, chronic lichen simplex, and perhaps some other dermatoses are symptomatic expressions of arthritism ; hence wrong diet, helped by bad general hygiene, may after a longer or shorter period of time lead to gouty eczema.

This he holds to be in harmony with the theory of the genesis of disease by retardation of nutrition and imperfect elimination.

Brocq's conclusion is that there must be no hard-and-fast line in the feeding of the subjects of affections of the skin. It is only after a minute examination, first of the dermatosis, then of the constitution, morbid tendencies and idiosyncrasies of the patient that a system of diet should be prescribed.

Crocker[1] says that even when the digestion is sound, it must be borne in mind that whatever irritates the gastric mucous membrane aggravates the skin trouble. Therefore, all highly spiced food, condiments of all kinds, should be avoided, salted foods are often injurious because they are less digestible, though they need not always be absolutely prohibited ; oatmeal and bran containing preparations generally do not suit those who have acute inflammatory affections. In the case of infants and young children with gastro-intestinal catarrh, starchy food should be avoided, or given sparingly and then with maltine.

Alcohol is contra-indicated in inflammatory affections in which it generally aggravates the pruritus and increases the hyperæmia.

In a discussion on the treatment of diseases of the skin by diet, which took place at the annual meeting of the British Medical Association in 1895, the subject was dealt with from

[1] *Diseases of the Skin.*

various points of view, but the net outcome of the debate might almost be summed up in the words of Byron :—

All that we know is nothing can be known.

Dr. Allan Jamieson, who introduced the discussion,[1] said the abuse of alcohol may give rise to local hyperidrosis, vascular dilatation and rosacea ; it intensifies the symptoms of psoriasis, and favours its transformation into exfoliative dermatitis. But the abuse of tea would seem to lead to worse consequences, for, besides causing cold hands and feet, and shrinkage and withering of the skin, it is in Jamieson's opinion probably much more efficient in the direction of augmenting the cases of cancer than increased consumption of animal food. He holds that hurry in meals is a cause of skin disease ; in particular, irregularity or haste probably bears a part in the production of alopecia areata. In some instances of lichen planus there is evidence of malnutrition ; boils are often traceable to sudden changes in diet ; in girls, acne is favoured by a too sparing diet ; and in lupus and allied tubercular affections deficiency in oily materials in the food of the young predisposes to the disease and helps to maintain it when established. In regard to diet in its therapeutic aspect, Jamieson has nothing more to say than that food ought to be plain and wholesome and should not be too concentrated. Dr. Walter Smith's contribution to the debate still holds the field as the best critical exposition of the subject. His teaching is expressed in two fundamental propositions, namely, that the real influence of diet in the causation of skin diseases is a small one ; and that our substantial knowledge of the subject is very limited. In the matter of diet we are always confronted with the problem of idiosyncrasy, and in very many cases an intelligent and temperate patient knows, or ought to know, better than his doctor what suits him and what aggravates his complaint. There are, according to Smith, four ways in which diet may possibly influence the skin : (1) Through the general nutrition of the body ; (2) by acting as a reflex stimulus from the gastro-intestinal tract ; (3) by absorption into the blood of irritating substances or of products of chemical change, which indirectly affect the skin ; (4) the skin may suffer in virtue of being one of the channels or avenues of elimination.

[1] *Brit. Journ. Derm.*, October, 1895, Vol. VII., p. 328.

In considering skin diseases in relation to diet, they may be grouped into (1) diseases liable to originate in, or acknowledged by general consent, to be materially influenced by diet—among such Smith instances certain forms of erythema, urticaria, pruritus, acne rosacea, and perhaps acne vulgaris; (2) diseases possibly influenced by diet, but not proved to be so—among these are placed psoriasis, most cases of eczema, and of acne vulgaris; (3) diseases certainly not affected by diet, as herpes, pemphigus, lichen ruber, ichthyosis, ringworm.

Smith summarises his conclusions as follows:—

1. Very few skin diseases are directly traceable to dietetic causes, but improper diet may aggravate existing eruptions. Idiosyncrasy must be largely allowed for.

2. The diseases that may so arise are of a transitory character, and mostly belong to the class of erythemata.

3. Diet has very little influence in promoting the cure of cutaneous eruptions. The results are far behind popular expectations, even in such cases as acne rosacea, where we are led to hope for much.

4. Avoidance of alcohol, regulation of the bowels and cure of anæmia are of infinitely greater importance than special dieting in the management of skin diseases.

My own attitude was formerly almost nihilistic. My teaching comprised little more than that the guiding principle in the matter of diet was to forbid all food of a stimulating or constipating character, and to enjoin total abstinence from alcohol as a counsel of perfection. While still believing that the influence of diet in the production and aggravation of skin diseases has been immensely exaggerated, riper experience has led me to attach somewhat more importance to it in treatment than Walter Smith does.

GENERAL NOTIONS.

Our knowledge as to the causation of skin diseases has, to a large extent, been revolutionised by bacteriology, and the field of operation left for such factors as cold, wet, and food, those *dei ex machina* which in less scientific days could be so conveniently invoked, becomes narrower day by day. Food, however, still holds a distinct place in the etiology

of skin disease. It is unquestionable, for instance, that an insufficient or improper diet must impair the nutrition of the skin, as well as other parts, and lessen resistance to the attack of the tubercle bacilius and other organisms. It is equally undoubted that in certain persons certain alimentary substances cause disturbance of the digestive apparatus, which is reflected on the skin in the form of erythema or urticaria. The most familiar instance is shellfish poisoning, but similar effects may be produced by pork, almonds, strawberries, parsley, mushrooms, and oatmeal. Brocq found that the allowance of an unlimited amount of coffee made all his acute cases suddenly worse.

It is the fact too that the ingestion of certain ptomaines, or other toxic or irritating substances may give rise to a condition of general toxæmia, which may manifest itself in the form of erythematous and possibly other eruptions on the skin. Instances of this are the rashes that often follow the injections of serums of one kind or another, and it is conceivable that the use of tinned meat, bad fish or high game may have similar effects. Toxæmia may also be caused by constipation. The hyperæmia produced by alcohol, if it lasts any time, may perhaps be explained in this way.

Again, as there are drugs which, by the irritation to which they give rise in the course of elimination through the skin, or by some obscure elective affinity for the cutaneous glands, cause eruptions on the skin, a like effect may be produced in the same manner by certain articles of diet. An illustration of this mechanism may perhaps be found, as Smith suggests, in the aggravating effect of the volatile oils contained in highly seasoned food and spices on acute inflammatory diseases of the skin.

In all these cases the lesions produced on the skin, whether erythematous or urticarial in character, are evanescent. Moreover, as they occur only in certain persons, the cause of whose special susceptibility is a mystery, they cannot supply a basis for any rule of treatment beyond avoidance of the injurious article of diet when it happens to be known. The whole subject of individual susceptibility deserves more study than, probably owing to its extreme complexity, it has yet received. It might be found that in a given person the susceptibility varies

according to age or condition of health; again, the way in which the food is prepared and the accompaniments with which it is taken, by modifying the chemical products in the various stages of digestion, may have something to do with the special effect. Until the mystery of idiosyncrasy is cleared up, the prescription of diet must necessarily be a leap in the dark.

In the meantime, from the knowledge we have that under special conditions certain articles of diet may cause lesions of the skin, it is a legitimate inference that they may aggravate an existing cutaneous disease, as, for instance, by fanning the slumbering embers of a chronic process such as eczema into a flame, and that they may help to maintain in activity a process that would otherwise have died out. It is easy to understand how the unrestrained use of alcohol and fiery condiments, such as cayenne pepper, curry, chutny, and the various chillies, in which the jaded European stomach finds a stimulus to unnatural exertion in tropical climates, must tend to intensify an inflammatory process, and may quicken a quiescent disease into fresh activity. It may be mentioned here that tobacco, though it can scarcely be called an article of diet, has the property of causing flushing. Alcohol and coffee have often the special effects of giving rise to itching. Substances which cause digestive disturbance, and still more those which give rise to toxæmia, are by that very fact contra-indicated. This is really all that can be said in a general way in regard to diet in skin disease.

Among the special articles, in addition to alcohol and coffee, that may be held responsible for affecting the skin in a harmful way, Smith enumerates tea—"perhaps"—highly spiced foods, the excessive use of hard salted meat, shell fish and starch, and other carbohydrates which may lead to the production of an excess of acids (acetic, lactic, butyric) in the intestinal canal.

The notion that salted food is injurious to the skin is a tradition of hoary antiquity. A notion of this kind, which has been for so many centuries, often represents a pretty general experience, and is not lightly to be dismissed as a fancy. My own experience, however, agrees with that of Smith, who says that for many years he has ceased to take any account

of the supposed noxiousness of salted food, and neither his patients nor himself have had reason to regret the liberty accorded them. An excessive consumption of meat is, by some, held responsible for the production of boils and eczema. I do not know of any evidence in support of this view. Too liberal a meat diet is, of course, bad for persons in whom there exists a tendency to gout, but I have never been able to convince myself that there is any definite connection between gout and skin disease. Certainly, with all due deference to Brocq, I know no special type of cutaneous affection to which the term "gouty eczema" or "gouty psoriasis" could be applied.

SPECIAL INDICATIONS.

We may now proceed to apply such general notions as we have gathered to the treatment of special groups of diseases or particular affections. In the case of local inoculable diseases, of which *itch* may be taken as the type, diet has no direct influence. Irritating substances or alcohol may, indeed, increase the inflammatory mischief that often follows scratching. In certain conditions, again, such as *favus*, in which the soil is prepared by malnutrition, proper feeding will be a help towards recovery. In dealing with *boils*, although Pye-Smith says that in some patients a fresh outbreak of follicular inflammation can be produced at will by eating crystallised fruits, strawberry jam, or orange marmalade,[1] I have never seen any ill effect that could be traced to diet. It may be remembered that our soldiers in South Africa suffered grievously from boils, which, by several of the witnesses who gave evidence before the Royal Commission, were attributed to the eating of tinned foods. I think this attribution is quite wrong. The boils were doubtless due to oversweating, as is often seen in oarsmen and other athletes, and in those who go for long walking tours in Switzerland. This is proved by the fact that the boils arise in regions such as the fold of the nates, where there is intertrigo, and in the neck, where the skin is exposed to chafing by the collar.

In constitutional infections, such as *tuberculosis*, in which the nutrition is impaired, the necessity of feeding up is obvious. On the other hand, in the earlier stages of *syphilis*, when there

[1] *Brit. Journ. Derm.*, July, 1895, quoted by Walter Smith, *loc. cit.*

is fever, the diet should be as simple and bland as possible, and alcohol should be forbidden. But in the later stages, in which wasting may occur, nutrition must be maintained at the highest attainable level.

In *eczema* the question of diet is held by many to be of the highest importance. Thus Besnier[1] says that the majority of sufferers from this disease eat too much or too well, out of proportion to the combustion performed. With these it is nearly always sufficient to obtain a favourable change by lessening meat by one half, only giving it regularly for one meal a day. The total ingesta for each day should be limited, and the physical expenditure increased. Evacuations should be encouraged, and the body weight lessened in a proportion appropriate to each individual. The quality of food and drink should be definitely prescribed, the practitioner being guided by the effect of food in each individual case. He should forbid large sea fish, shell fish, and crustaceans, pork, veal, salt meats, preserved meats, game, cheeses (fermented and salted), vegetables containing oxalic acid, asparagus, tomato, spinach, sorrel, &c.; all uncooked vegetables, and salads, cress, horseradish, radishes, cucumbers, truffles, vinegar, pickles, strawberries, raspberries, gooseberries, oranges, alcoholic drinks, and all liqueurs, strong beers, champagne, tea and coffee, &c.

Generally, all foods should be forbidden in the preparation of which acids enter at all largely, also spices, salt, and sugar. The diet should consist of butcher's meat (except veal), poultry (except goose, turkey, and duck), fresh eggs, green vegetables freshly cooked (except sorrel, spinach, cress, kale), cooked fruits, milky foods of all sorts, feculents in small quantity, white unsalted cheese. For drink pure water is best, but anodyne waters (d'Alet or d'Evian) suit some; others require bitter infusions (hop), skimmed milk diluted with pure water, or a slightly alkaline water may be allowed. In the acute stages, and in exacerbations, a strict milk diet is necessary. Cider suits some patients, but not all; wine is good for none. In nurslings the greatest attention must be paid to regular feeding and to the nourishment of the nurse.

I have given Besnier's dietary scheme in detail, because his authority in matters of dermatology is deservedly of the highest, and because his formidable *Index ciborum prohibitorum*

[1] *La Pratique Dermatologique.*

is followed by Stelwagon and others. To my mind the problem is much simpler. I do not agree with Brocq that the regulation of the diet is the most efficacious internal treatment of eczema. All that need be done in my experience is to adjust the diet to the character of the disease. If it is acute, extensive in distribution, and marked by troublesome subjective symptoms (itching, heat, and pain), a simple diet is naturally indicated; in very severe cases, where the patient is distinctly ill, we may restrict him to milk till the violence of the process abates. But in chronic cases, where the skin lesions are of small extent and quiescent, no particular dietetic restriction, except in the matter of alcohol, is called for.

In *seborrhœa* no special diet is needed, but care should be taken to avoid anything likely to upset the digestion.

In the treatment of *psoriasis*, I have not found occasion to prescribe any special diet, except when the skin affection is associated with rheumatoid arthritis. In such cases I have obtained excellent results from a system of exclusive meat diet washed down by copious draughts of hot water. By way of explanation, I can only suggest that the simple diet improves the digestion, while the flushing with water brings about a thorough elimination of waste products.

Chronic cases of *lichen planus* are often benefited in the same way. I have not, however, found the treatment referred to of any particular value in cases of ordinary psoriasis where no toxæmia is present.

In the treatment of *acne*, and still more of *rosacea*, everything likely to cause indigestion must be avoided. In particular, alcohol, tea, coffee, and all kinds of food that causes flushing must be rigorously excluded. The same rule should be observed in dealing with *erythema multiforme*, and *dermatitis herpetiformis*. Feeding up is often required in the after treatment of *herpes zoster*, especially in the aged.

In *pruritus ani* and *vulvæ*, coffee and alcohol should be absolutely proscribed; shell-fish, pickles, or highly-seasoned, salty, or preserved food should be avoided, and the diet should be restricted to white meats, green vegetables, and light milk puddings.

In *urticaria* the responsible agent for the attack should be excluded, and the diet must be bland and unirritating for some days. In chronic cases no stimulating food and no

alcohol should be allowed. If the affection is obstinate, strict milk-diet in small doses, frequently repeated, may be given till the eruption disappears.

In skin diseases due to nervous disturbance, the main dietetic indication is a liberal supply of fatty material which builds up nerve-tissue. In the group of *angio-neuroses*, the vaso-motor disorder is often caused by toxic matters contained in, or developed from, the food. A strict watch must be kept on the diet in this respect. In the form of angio-neurosis, characterised by feebleness of the circulation and a tendency to chilblains and Raynaud's disease, hydrocarbons are particularly indicated. Cream and butter are also of the greatest service in such cases.

General conditions, such as diabetes, Bright's disease and anæmia, underlying skin diseases must be dealt with on the dietetic principles severally appropriate to them. On this subject there is little to say. It must, however, be pointed out that in cases of psoriasis, in which Bright's disease co-exists, the skin affection is often cured by milk diet. Anæmia is present in a large proportion of cases of acne in young subjects, and this fact must be taken into account in the treatment.

I have been able to touch but lightly on a few salient points. I have to deal with somewhat vague generalities, but on a subject as to which so little is known it is impossible to be very definite. After all, it is in comparatively few cases of skin disease that the diet is really of any particular importance. The guiding principle is to forbid anything that is likely to aggravate the existing disease by overstimulating or otherwise disordering the local circulation, or to produce fresh lesions by causing reflex disturbance or toxæmia.

What (in addition to alcohol, coffee, condiments, &c.) these substances are can be discovered only by careful observation of the individual patient. Put not your faith in printed dietaries or indeed in any general formularies. Above all remember that the patient has larger and better opportunities of observation than the doctor, and, if he is a person of ordinary intelligence and self-control, he should be trusted. The doctor who attempts to dictate as an oracle in the matter of diet is like Lord Foppington's bootmaker, who insisted that he knew better than his client whether or not the shoe pinched.

DIET IN THE TROPICS.

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DIET is so closely connected with race, custom, and climate that its diversity is almost as great as the clothing of different nationalities in different latitudes. The inhabitants of cold regions, or of high altitudes in the tropics, are differently clothed from those in the torrid zone. Temperature is the great ruling factor in determining the difference. Generally the hotter the climate, the lighter the clothing worn, but variety in the dress, whether scanty or full, is dependent more or less on race, custom, and fashion, and the particular notions held, concerning its fitness, depend very much on what each is accustomed to see. The variation which may be considered attractive and *comme il faut* by one race may be considered objectionable and indecent by another. The Chinawoman, for instance, would look askance at the evening dress of the fashionably-dressed European, while the latter would dubiously regard the clothing of the Hindu woman in the plains of India. It is the same with diet, temperature has a very powerful determining effect on the kind of food relished, but racial preferences and customs exercise an important influence. Each race thinks that that which it is the most accustomed to is the best, and often entertains very pronounced views regarding the food of others. The delicacies of the one do not, as a rule, appeal to the others. However great the variation in this respect may be, the broad fact remains that the people of cold climates prefer meats and fats, when they can get them, with only a small supply of products from the vegetable kingdom. It is the ideal ration aimed at by them as wealth increases. True, it is not the ideal attained to by the majority. It is more readily reached by the inhabitants of towns than by those of the country. Even in those countries that consume the largest amount of meat the supply to the peasants is limited, and the food, where fish is not available, is principally vegetarian. At a

time when no efforts are spared to increase the amount of meat in the diet, it might be a pertinent question to ask what influence the simple diet has on the superior health of country folk.

On the other hand, the inhabitants of hot climates are generally content with milk products, cereals, pulses, fruits, and sugars. There are exceptions. The Arabs of East Africa, the pampas Indians, and the Abyssinians are often quoted as examples of consumers of large quantities of meat, although they are inhabitants of hot countries. They are all very active races, and by no means lead a sedentary life. Exceptions are useful for the purpose of showing that it is possible for man to adapt himself in any circumstances to any kind of food, so long as it contains nourishment; but it by no means follows that it is the most suitable. I once met in Ceylon a German cavalry officer, who had given up his commission in the army in order to be able to carry out his project of living on fruit. He had found a diet of that kind too expensive to live on in Berlin, where fruit was costly, and had wandered over the greater part of the world in search of a place where he could live on fruit in comfort. He settled for some time in Honolulu, where the conditions were more in keeping with his purse; but, becoming tired of the life there, he determined to settle in Ceylon, where the cocoanut, the banana, the mango, and other equally tasty fruits were obtainable. He had lived in this manner for three years, never touching vegetables in the sense of those products which when ripe have to be gathered from the ground. He was an interesting person, and was a man of good and sound intellect on general subjects, with a strong muscular and healthy body. He was a splendid swimmer, and in the best of health. He certainly never consumed 100 grammes of proteids per day; half of that amount would be nearer the quantity. Most men called him a faddist, and I was not inclined to differ from them on that score, but, at the same time, he always appeared to me as an embodiment of an experiment, which showed that it was possible for a European to live, in certain circumstances, quite well and happily as a fruitarian, losing nothing in health and strength, and capable of much exertion in the tropics without undue fatigue.

It may be stated generally that, for those born and bred in

tropical regions, a craving for meat and fats, such as is evidenced among the inhabitants of colder climates, does not enter, as a rule, into the indulgences or luxuries of even the richer class. If there is any craving it is generally for sugar, which, in the case of excess and malnutrition, apparently leads to a chronic form of diabetes.

The large share which sugar takes in the diet of the inhabitants of warm climates is very noticeable to the European who visits the tropics for the first time. Sweetmeats, in every shape and form, enter largely into the diet, and presents of sweetmeats and fruits correspond with presents of game in colder climates.

A land flowing with milk and honey is the ideal country which the Israelites longed for, and it is such a land that most inhabitants of a tropical climate prefer. Meat is not excluded from the diet, but it is nowhere held in the same estimation as it is in cold climates. Religion and race frequently restrict the supply. The eating of certain kinds of meat is often forbidden on religious grounds. The hog is as much an abomination to Hindus and Mahommedans as it is to the Jews to-day, and as it was in earlier times to the Egyptians. In hot climates the pig may be good for scavengering, but it is not good for food. Experience has evidently taught that, in the tropics, the pig is an unclean animal, and, with its uncleanliness, it is liable to diseases which may be communicated to man when its flesh is eaten. The Chinese, who carry their taste for pork wherever they go, like it well roasted, and in this way, perhaps, escape many of the dangers incurred through partaking of its flesh. But even the Chinese, as a rule, desist from eating pork during the hottest days of the year, for then they find that it disagrees with them.

The cow is sacred to some 250 millions of the people of India. In any circumstance it is too good a friend to the peasant to be slaughtered and eaten. The exact reasons which may have influenced early lawgivers to impose, by religious laws, restrictions on the slaughter of certain animals for food, may not now be known, but it is certain that the effects of these limitations exercised an important influence on the supply of meat, and probably indirectly induced large populations to adopt a simple, or modified, vegetable diet.

In India, for example, the principal article of food in Bengal, Burmah, Madras, and Assam is rice ; mixed with pulse, and a little ghee, or melted butter, and a few vegetables and fruits, it suffices for the wants of the people. In Northern India, which is not a rice-growing country, the millets and pulses are eaten by the poor, while the richer classes are able to afford wheat and barley. Indian corn is eaten by all. There are Hindus who take no animal food beyond that of milk and ghee. There are others who take fish and eggs, and others who eat certain kinds of meat, abstaining however from beef and pork. The Sikhs and the Punjaubis are reputed to be the finest soldiers in India, with the exception perhaps of the Ghoorkhas, who are hill men. The Sikhs eat goat and mutton. The Punjaubi Hindus eat no meat, but the Punjaubi Mahommedans do. It should be noted that Northern India has a prolonged cold season. The meat, however, is taken neither so frequently nor in such quantities as is common among Europeans. It is to be observed also that the fasts of the Mahommedans, and the prolonged one of the Ramadan, when for a month no food or drink is taken during the day, assists the system to recuperate from the effects of excess, and from ill results caused by defects in the eliminatory function of over-strained organs. It may not be such a pleasant process as drinking the waters at Homburg, Baden Baden, Wiesbaden, Strathpeffer, Harrogate, and other health resorts, but the results obtained are very much the same.

When the Aryans first descended into the plains of India they were meat eaters, but the experience of the centuries evidently taught them to be vegetarians, or to be very sparing in the amount of meat they ate, and at the same time to become total abstainers. This is an experience, the lessons of which Europeans who go to the tropics are inclined to ignore. Accustomed to living well in their own country, in which large quantities of meat, fats and rich food, as well as wines and spirits, form an important part of their diet, they are tempted to continue, as closely as possible, a similar diet in the tropics. Some do well on such a diet, but they are exceptions. Now and again an individual is to be found in the tropics who has broken every canon of the laws of health, and does not seem to suffer, but such is a "rara avis." The majority, who persist

in high living in the tropics, pay for it sooner or later in some form of intestinal disorder, colitis, disease of the liver, or nervous affection. To overfeeding and defective diet are ascribed many of the illnesses which prevail in temperate regions, but there can be little doubt that the effects are intensified in the tropics. The history of the British occupation of its tropical possessions is full of illustrations of sickness and death from want of adjustment of the diet to the new conditions. The soldiers who first went to the tropics took with them everything European, and a full measure of contempt for the customs of the natives. There was no attempt to adjust the mode of life to the very different conditions under which they were placed. In the West Indies they ate their salted meat, drank their rum, and wore the same clothing as they had done in England, and these habits, combined with the insanitary conditions under which they were placed, led to sickness and an early death. It is recorded that the life of a regiment under these conditions was about 5 years; that is, the death rate was about 200 per 1,000 per annum. This was at a time when dietetics were not understood, and the ill results of dietetic errors were common even in temperate regions. The diet indulged in in the tropics, at that time, was as unsuitable as the clothing. Old paintings of East Indian life portray the European civilian in his tall hat and evening dress coat, riding or taking exercise, and the soldier clad in the same uniform as in the Peninsular War. Old records establish that high feeding and much drinking were considered to be necessary to counteract the debilitating effects of the climate. Heavy dinners, begun at mid-day and continued well into the afternoon, were responsible for many duels, and that irascibility and jaundice which gave rise at one time to the popular notion that the latter were the characteristics which belonged to those Nabobs of India who were fortunate enough to return to their native country.

Like the pagoda tree, which everyone was supposed to shake when he went to India, or the tropics, and consequently to return fabulously wealthy, the Nabobs of the type just mentioned have disappeared.

A gradual improvement in the diet has effected a great

change in the health and mortality of Europeans in India, and there can be little doubt that, if the example were followed in West Africa, where at present too little attention is paid to this subject, the high mortality, which now prevails there, would be considerably reduced. In extenuation it may be fairly said that the exile, isolation, monotony, and solitariness of life, in all out-of-the-way tropical regions, contribute to the depression produced by climate, and tend to favour recourse to a stimulating diet, which in its turn is injurious to the system.

Although there is still much illness due to unsuitable diet, yet the gross feeding and heavy beer drinking of former days have gone. Relics of them are only seen now in the Sunday luncheons, which are still a favourite means of entertainment and hospitality among many young people in the tropics. Apart from this, the tendency is towards a much simpler fare, in which less meat is eaten, and less alcohol drunk. Many people have their Chota Hazari, which is equivalent to the *petit déjeuner* in France, between 6 and 6.30 a.m.; their Burra Hazari, or *déjeuner*, at 11 or 12; their tea at 4 or 5, and their dinner at 8. Others, again, take tiffin at 2 o'clock, besides their breakfast at 9 or 10. The latter custom is not so commendable as the former. Rice, pulse, fruit, and vegetables enter, as a rule, largely into the *menu* at breakfast and tiffin. For dinner there is little difference between the *menu* in tropical climates and that in Europe. This is not a vegetable diet, but it is one which contains a very much less quantity of concentrated proteids in the form of meat than that which entered into the meals of former days. The general tendency, it may be stated, is towards a modified vegetarianism. It is also associated with the consumption, at luncheon and dinner, of very much less alcohol, whether in the form of beer, whisky and soda, or heavy wines. The substitution of the afternoon tea for the customary whisky and soda, or brandy and soda, also contributes in no small degree to a healthier condition.

The gradual tendency to adopt a more or less modified vegetarianism in comparison with the richer and more animal diets of olden days, in order to reach a proper diet conformable to racial customs, and yet adjusted to the conditions of climate, has, in the first instance, been due to the teachings of

experience, probably assisted by seeing large populations in the tropics, well developed physically and mentally, living on a simpler diet as regards meat and alcohol. Doubtless, it will be quickened by a recognition of the laborious tasks that can be accomplished on a simple diet, as illustrated in the achievements of the Japanese, who are a rice-eating people, and whose sustenance consists mainly of vegetables and fish.

It has always been difficult to explain why the races referred to were able to maintain their strength on a smaller quantity of proteids than our physiological theories indicated as necessary ; but the recent experiments of Chittenden give a clue to the apparent contradiction. They show that the amount of proteid necessary for the maintenance of health, even under the conditions of hard work, has been very much over-estimated. The old standard has been, at the best, a diet of excess. Frugality in relation to this standard has not been underfeeding, but a nearer approach to an economical balance of income and expenditure, while liberality in interpretation meant decided overfeeding.

Apart from the excessive quantity of meat and alcohol which is partaken of in the tropics, but which is being gradually diminished, the principal defects in the present-day diet of the tropics are the soups and the rather frequent recourse to long iced drinks. The latter are often taken between meals, and are an active factor in the production of constipation. Both lead to dyspepsia and not infrequently to dilatation of the stomach, which is one of the more common affections from which residents in the tropics suffer. Dilated stomach, in those who have returned from the tropics, is a more common cause of indisposition than is generally recognised. It is always well to examine for this condition in a patient with yellowish conjunctivæ and furred tongue, and who complains of nausea, dyspepsia, languor, and palpitation. In such a case it is probably combined with enlargement of the liver.

The effects of over-indulgence in alcohol are very marked in the tropics. Hepatitis, and liver abscess, which is otherwise uncommon, occur among natives who give way to drink, a habit which is not infrequently associated with other changes in diet, more or less imitative of European customs. The

diseases of the liver, induced in Europeans, are more of a chronic nature, for it is seldom that drink in the same quantities is indulged in. Nevertheless, there are, in many circles of society, some members who, without taking more than they can apparently stand, take much more than is good for them. Neurasthenia, depression, and incapacity for mental work in the tropics not uncommonly owe their origin to a consumption of alcohol, which would be without any corresponding effect in a more temperate climate.

The diet may thus be injurious in the tropics, because the principles of a healthy regimen are disregarded. This is remediable, if the person will follow advice. There are other ways in which the diet may be injurious, and though preventable, are not so much under the control of the individual, unless the food and cooking arrangements are carefully inspected. The food may be diseased, and of inferior quality, and nothing but inspection will prevent this. There is also the adulteration to which food is subjected in the tropics, and in this category are the oils used for cooking. The dietetic oils are often adulterated with ground-nut oil, poppy oil, colza oil, and chillis, all of which are liable to give rise to dyspepsia and other gastro-intestinal troubles, which in their turn render the subject more susceptible to dysentery, sprue, and other well-known diseases of the tropics. When such patients come under treatment in Europe, it is only by conformity to a strict regimen that health can be restored.

BY-PATHS OF MEDICINE.

THE METHOD OF CORNARO.

FROM earliest times man has dug his grave with his teeth, and, if in these latter days he has, to some extent, ceased to do so, it is because comparatively few have any teeth to dig with. The diet of primitive man would have killed us, and even that of our mediæval forbears, with their venison pasties and strong ale for breakfast, makes us shudder. Falstaff has sung the praise of sherris-sack—that it begets wit and warms the blood and makes its course inwards to the parts extreme. Yet sack must have sown a terrible seed of gout and kindred ailments, of which the descendants of mediæval topers are now reaping the harvest. On the other hand, it is not easy to imagine primitive man fighting with mammoths in his struggle for existence on a diet of "proteid biscuits," "proteid cocoa," "proteid nut butter," even reinforced with the addition of cheese, nuts, dried fruits, and vegetable jelly.

When man began to devise systems of diet it is not easy to ascertain. We know that the Father of Medicine found it necessary to raise a warning voice against too spare a dietary. The Romans of the later Republic and of the Empire, as we know from the letters of Cicero and from the satirists, indulged freely in the pleasures of the table and stimulated overburdened nature by artificially emptying their stomachs. It was doubtless Pliny's dislike of doctors that led him to speak scornfully of great men who suffered themselves to be controlled in the matter of diet. We quote the fine old translation by Philemon Holland:—

"Like to the former rules in this also, as touching our diet, that it be not too precise, but so as we may feed indifferently of all viands, and acquaint our bodies with varieties of meats; which is observed to be the best way to maintain our health; and in very truth, *Hippocrates* saith, That to eat but one meal a day to forbeare dinners, is a diet that will drie up a man's body within, and bring them soon to age and decay. But this

aphorism of his he pronounced as a Physitian to reclaim us from that hungry and sparing diet, and not as a patron and maintainer of full feeding and gourmandise; for I assure you, a temperate and moderate use of our meats is the wholesomest thing that is for our bodily health. But *L. Lucullus* was so strict herein, that he suffered himself to be ordered and overruled by his own servant, who would not let him eat but as he thought good; in such sort, that it was no small disgrace unto him in his later daies thus to make his man his master, and to be governed by him rather than by his own selfe: for was it not (think you) an approbrious and shamefull sight, to see a slave and no better, to put his lord's hands from a dish of meat, beeing an aged gentleman as he was, and who in times past had rode in triumph; to gage him thus (I say) and keep him short, though hee was set amongst great states at a roiall feast within the capitoll of Rome?"

The slave referred to was probably Calisthenes, the physician, for in those days physicians were reckoned but servants to such magnates like Lucullus. Calisthenes would seem to have been a forerunner of the learned Dr. Pedro Recio de Aguero, who enforced such strict temperance in eating on Sancho Panza. The poor Governor of the Island of Barataria sat at a Barmecide feast, where a dish was no sooner served than it was touched by the physician's wand, and taken away as too "moist," or too "heating," or hurtful in some other way. Dr. de Aguero said he spent his days and nights studying the diet most suitable for his patient. One wonders whether he followed his own precepts. Even modern dietetic oracles have been seen on occasions, when the physician comes down from his tripod and mingles with his fellowmen as one of themselves, to eat heartily of the fruit which they forbid to others, and drink freely of liquids which in their official capacity they denounce as poisons.

In the versified code of rules for the preservation of health known as the *Schola Salernitana*, which dates from the eleventh century, diet naturally occupies an important place. Many of the precepts hold good at the present day. Thus a proper interval should be allowed between meals:—

> Tu nunquam comedas stomachum nisi noveris esse
> Purgatum, vacuumque cibo quem sumpseris ante.

And again :

Non bibe ni sitias et non comedas saturatus.

Moderation in eating is the secret of long life :

Pone gulæ metas ut sit tibi longior ætas.

The list of forbidden foods is as long as that of a modern dietetic specialist, and is equally arbitrary.

The most famous of all writers on diet is Ludovico Cornaro, a Venetian noble of a family that had given three Doges to the Republic. He was born in 1467, and died just before he completed a century of life. He lived like Dives in the Gospel till the age of thirty-five or forty, when his health was so much impaired that he determined to follow the advice given to Falstaff to purge and leave sack, and live cleanly as a gentleman should do. He says his stomach had become very cold and moist, and that he had fallen into all kinds of infirmities—pain in the stomach and often in the side, and beginnings of of gout with a *febbricina quasi continua* and a perpetual thirst. He tried everything, but nothing did him any good. Then the doctors told him that there was only one medicine for his ailments and that was a sober and temperate life ; they added that if he did not make up his mind to adopt this plan at once, in a few months it would be of no use, and a few months later he would be dead. Cornaro gave heed to his doctors, and on their instructions consented to eat and drink like an invalid and in small quantity. He confesses that the doctors had often given him the same advice before ; nevertheless, he had gone on drinking various wines that pleased his palate in large quantity, and, like all patients, without thinking it necessary to say anything of this to his physicians. In less than a year the simple life cured him of all his infirmities. He then made a study of diet with the object of ascertaining whether the proverbial saying that food which is agreeable to the taste, nourishes and does good, is based on truth. Cornaro satisfied himself that it is untrue, as very cold wine, melons and other fruits, uncooked salads, fish, pork, pastries, and other things which he loved were injurious to him. He, therefore, confined himself to food and wine which he knew by experience to be suited to his stomach, and he made it a rule not to glut his

appetite, but to rise from table unsatiated. Besides following this rule of diet, Cornaro took care not to expose himself to excessive heat or cold; he avoided fatigue, and in particular never allowed his ordinary allowance of sleep to be interfered with; he used venery with moderation, and took care to live in good air, and not to suffer hurt from wind or sun. He refrained himself from indulgence in melancholy, hatred, and the other disorders of the soul which have a very great influence on the body. Cornaro might have anticipated the teaching of Sir Andrew Clark that only a very strong man can afford to be angry, and he led a life which would have been deemed ideal even in Sir Benjamin Ward Richardson's City of Hygeia. Being after all human, he occasionally fell away from hygienic grace; but on the whole Cornaro says his rule of life enabled him to bear the law's delay and other evils with unruffled serenity. At the age of seventy he was thrown out of a coach and dragged some way by the horses. The doctors gave him up, but he got well in spite of them.

Cornaro's diet consisted of bread, eggs, flesh, and broth, the total weight not exceeding 12 ounces. Yielding to the importunities of his friends, he increased the quantity of food by two ounces, and of drink from 14 to 16 ounces. In ten days, however, he became melancholy and choleric, and two days later he was seized with acute pain in he side with a "terrible" fever, which lasted thirty-five days. During all that time he was unable to sleep more than a quarter of an hour, and his friends gave him up for dead. Although he was then seventy-eight, however, he cured himself by returning to his previous dietary.

Cornaro was no fanatic. He had no wish to impose the details of his diet on others. He gave up fruit and fish because he found them hurtful; but he says that those who find them salutary ought to eat them. In like manner in regard to drink, his rule applies to others only as to quantity; but every one must choose a kind that he can take with advantage for his stomach's sake.

His simple mode of life made Cornaro able to mount a horse without help or vantage even in advanced age; he could, without the least distress, go up and down stairs and climb a hill. He managed his large estates, taking especial

pleasure in his gardens. He drained a marshy valley, and went about from place to place seeing whatever there was to be seen with ever-fresh enjoyment. His senses were perfect, and the society of his friends, among whom were many men distinguished in literature and the arts, afforded him keen delight. At 83, he composed what he calls a most pleasant comedy. He could sing with a clearer and fuller voice than when he was in the flower of his youth. In describing his way of life, he draws a picture of a beautiful old age, the opposite of the last scene of all depicted by the melancholy Jaques—

> Sans eyes, sans teeth, sans taste, sans everything.

With his handsome sons and grandchildren about him, he compares himself to God the Father, as painters show him, surrounded by his angels and archangels.

In a collection of medical opinions published in the *Strand Magazine* for February, one of the gentlemen whose views are there given speaks of Cornaro as weighing himself every day. This is a mistake. The man who weighed himself was an Italian physician named Santorio Santorio, who was born at Capo d'Istria in 1561, and took his doctor's degree at the University of Padua. After travelling in Poland, Croatia, and Hungary he returned to Italy, and in 1611 was appointed to the chair of medicine at Padua. In 1624 he settled in Venice, where he died in 1636. His mind evidently ran strongly in the direction of accurate measurement; for he used an instrument, said to have been invented by Galileo, to record the rate of the pulse beat and measure its length and force. He is said to have been one of the first physicians to use the thermometer for clinical purposes. The work by which he is best known is his collection of aphorisms, *De Statica Medicina*, in which he gives the results of observations on the variations in weight of his own body made during a long series of years. He seated himself in a specially constructed balance, and after weighing the food and drink which he required for twenty-four hours, he compared the weight with that of the fæces and urine excreted during the same period. From this he calculated the amount of weight lost by insensible perspiration. He took account of

Sanctorius in his Balance.

certain circumstances (sleep, exercise, coitus, &c.), which might cause vairation in the quantity of insensible perspiration,

diminution of which he looked upon as the cause of most diseases. He carefully discriminated between insensible perspiration and sweating, holding that the occurrence of the latter is followed by the suppression of the former. He recognised two kinds of cutaneous perspiration—one following sleep, the other which occurs in the waking state. He estimated the amount of insensible perspiration in twenty-four hours at 3½ to 4 pounds. But he took no account of the daily elimination through the lungs and saliva.

Coming to our own day, we find Cornaro's method revived, with modern improvements, by Mr. Horace Fletcher and Professor Chittenden. The simple truth, which so greatly pleased the miser in Molière's comedy, that we must eat to live, and not live to eat, is insisted upon by them, by Dr. George S. Keith, the venerable author of *Plea for a Simpler Life*, and *Fads of an Old Physician*, and others whose judgment is entitled to respect. As Mr. Dooley says, "Nowadays 'tis th' fashion to thry to emaciate ye'ersilf." But the simplest food at present available does not satisfy the aspirations of some ardent dietetic reformers. Nature is not good enough for them; her products are to be superseded by those of the chemical laboratory. The most advanced science, represented by M. Berthelot, looks confidently forward to the manufacture of food by synthesis. "Foods will then be manufactured with carbon obtained from carbonic acid, with hydrogen extracted from water, and with oxygen and nitrogen taken from the air." Corn-growing and cattle-raising will of course be superfluous. M. Berthelot does not take into account the fact that palatability of food is a necessary element in nutrition. Without this there is no "appetite juice," and, without that natural stimulus, the average sensual man would not take enough food to keep him in health. There are things that cannot be extracted from carbon, oxygen, hydrogen, and nitrogen, and one of them is "appetite juice." The solution of the food problem by tablets reminds us of nothing so much as of the philosopher in Laputa who thought he could extract sunbeams from cucumbers.

Practical Notes.

BEEF-TEA.—Take one pound of lean beef, mince it finely and place it in a large jam jar, with a little salt, and pour on to it a pint of cold water. This should be well stirred and then allowed to stand for about one hour. The jar should then be stood in a saucepan of cold water, which must be gradually warmed for an hour, or an hour and a half. After this time, the whole should be carefully strained, and the total quantity made up to a pint. If this meat extract is found to be too strong, it should be diluted as required. It may be advantageous, while the beef-tea is stewing, to add to it a few pieces of carrot, or green vegetable. It is important, in this connection, to note that beef-tea and such similar meat extracts must not be regarded as foods. They are valuable for invalids only because they are pleasant stimulating drinks, inasmuch as they contain very little of the nutritive material of the meat. The chief constituents of the beef-tea are water and meat extractives, such as creatine, creatinine, and lactic acid. Invalids, who are restricted to milk, soon tire of it, and they imagine that they can get sufficient nutriment by taking beef-tea instead. It is the duty of the medical attendant to correct such an erroneous idea. If the patient gets tired of milk, koumiss and junkets may be substituted.

MUTTON BROTH.—One pound of lean mutton must be cut into small pieces. These should be placed in a saucepan with three pints of cold water, and a little salt added. This should be slowly heated to boiling point, and then allowed to simmer for three hours. The whole must then be carefully strained, and the fluid allowed to cool. When cold, the fat, which has set on the top, must be skimmed off. When required for use, the broth should be gently warmed.

VEAL BROTH.—One pound of lean veal should be minced and placed in a covered jar with about one pint of cold water

and a little salt. After the whole has been allowed to stand for two or three hours, the temperature should be slowly raised to boiling point, and the boiling process allowed to go on briskly for two to three minutes. The liquor should then be strained, and any fat present removed. It should be served hot.

CHICKEN BROTH.—A chicken preferably, or half a large fowl should be thoroughly cleaned, and all the skin and fat completely removed. The whole, including the bones, must be finely chopped up and put with a little salt into a saucepan, with about two pints of cold water. This should then be slowly heated, and allowed to simmer over a slow fire for two hours. At the end of this time, it should be removed and allowed to stand, covered, for an hour, then the whole should be carefully strained.

RAW MEAT JUICE.—This is best made from a piece of rump steak. The steak should be finely minced and placed in a jar with just a little salt and enough cold water to completely cover it. Allow this to stand for about an hour. The meat should then be strained through fine clean muslin, and everything, so far as possible, forcibly expressed from the meat fibre into the liquor. This may be more readily done by using a pestle and mortar. The quantity of water added must vary in accordance with the strength of the juice required.

HUMANISED MILK.—The following directions for making artificial human milk are taken from Playfair's *Science and Practice of Midwifery* :—"Take half a pint of skimmed milk, heat it to about 96° F., and put into the warmed milk a piece of rennet about one inch square. Set the milk to stand in a fender, or over a lamp, until it is quite warm. When it is set, remove the rennet, break up the curd quite small with a knife, and let it stand for 10 or 15 minutes, when the curd will sink. Then pour the whey into a saucepan, and let it boil quickly. Measure one-third of a pint of this whey, and dissolve in it, when hot, 110 grains of sugar of milk. When this third of

a pint of whey is cold, add to it two-thirds of a pint of new milk, and two teaspoonfuls of cream, and stir. The food should be made fresh every 12 hours, and warmed as required. The piece of rennet, when taken out, can be kept in an egg-cup, and used for ten days or a fortnight.

"N.B.– It is often advisable, during the first month, to use rather more than a third of a pint of whey, as the milk is apt to be rather too rich for a newly-born child."

As rennet is somewhat difficult to obtain, Clark's essence of rennet may be readily used.

Artificially Digested Milk.—A pint of milk, diluted with a quarter of a pint of water, is divided into equal parts, one part being treated to boiling, and the other remaining cold. The two must then be mixed. In this way the required heat is procured—an essential point, for the ferment is destroyed by a temperature of over 140° F. The dilution prevents the curdling of the milk on the addition of the digestive fluid. Into the milk, thus prepared, are put two teaspoonfuls of Benger's, or Savory and Moore's, liquor pancreaticus and 20 grains of bicarbonate of soda, or one tube of Fairchild's zymine, and the milk is then placed under a cosy near the fire. It is to be tasted occasionally, and as soon as a bitter taste is perceptible—usually in from 15 to 20 minutes—the whole is boiled, to prevent any further action. It is then ready for use. It may be rendered more palatable by the use of skimmed milk, and by restoring the cream after the digestion has been accomplished, and the process stopped by boiling. If the digestion is allowed to proceed too far, the product will be bitter and unpalatable. The process is made even simpler by using the peptonising pellets prepared by Messrs. Savory and Moore. The milk is brought to the requisite heat as before, and one pellet added to the pint. A quarter of an hour is the average time for the adequate change to be accomplished. (Roberts, quoted by Goodhart and Still.)

Koumiss.—This is made by mixing together 40 ounces of new milk, 40 ounces of water, one ounce of brewer's yeast,

and three ounces of cane-sugar in an open jar. This mixture is allowed to stand at 30° C. for about six hours. When bubbles of gas begin to rise on it, 40 more ounces of new milk, 40 ounces of water, and 4½ ounces of lactose should be added. This fluid must now be bottled, and the bottles very securely corked. These bottles must then be kept in a cool place for at least five days before the koumiss is used. The bottles must be tapped with a champagne cannula, the corks being left in position. If the koumiss is to be used for feeding babies, before it is administered it must be shaken in an open glass in order to allow the gas to escape.

JUNKET.—To a pint of new warm milk, in a bowl or dish, add a teaspoonful of cane-sugar and two teaspoonsfuls of Clark's essence of rennet, stir gently for a few seconds, then stand it in a warm place until the curd is firmly set. The caseinogen of the milk is converted into insoluble casein. The junket should then be set aside in a cool place until required. This may be served with or without cream. A little brandy can be added previously to the milk, if desirable.

WHEY.—A pint of milk should be warmed to blood-heat; then a teaspoonful of some artificial rennet, such as Benger's, should be added. In a short time the casein, or curd, separates from the fluid called the whey. The curd may then be broken up with a fork, and the whole should then be strained through a piece of linen. The whey should then be boiled and again strained. Whey thus prepared may be given to a newly-born infant, cream or milk being added according to its powers of digestion. Whey, with a little brandy added, is a useful substitute for "white-wine whey," and generally agrees better. (Ashby and Wright.)

WHITE-WINE WHEY.—Heat half a pint of milk to boiling point, and then add a wineglassful or two of sherry. This causes the caseinogen of the milk to be precipitated. Heat the whole now to boiling point, then set aside until the

precipitate settles. This should then be strained off through muslin.

Beef Pulp.—Take a piece of raw, lean, rump steak, or undercut of sirloin of beef, and scrape thoroughly, so as to separate the muscle fibres from the tendinous parts. Discard the latter, and pound up the remainder in a mortar into a pulp ; then rub through a hair sieve and season with a little salt and pepper.

A teaspoonful, rubbed up with water to the consistency of thick cream, may be given three times a day to an infant under one year. For older children, it may be rolled up into small balls, and lightly fried or grilled. Or it may be given when spread between thin layers of bread and butter. This is a very nutritious and digestible food.

In the use of raw meat preparations, there is a slight danger arising from the possible introduction of the cysticercus of one of the tapeworms. This danger is, however, small, and far counterbalanced by the amount of good which some of these preparations accomplish, especially the raw meat pulp made as described. (Cautley.)

Egg Albumen Water.—The white of a raw new-laid egg must be separated from the yolk, carefully beaten up, and added to half a pint of cold water. The mixture should then be well shaken in a large closed bottle. If it is necessary to flavour it, this may be done by adding dill water, or cinnamon water, and a little sugar.

Barley Water.—Thoroughly wash the pearl barley, put two or three teaspoonfuls of it into a saucepan together with a pint of cold water, then boil the whole until the fluid has diminished to about two-thirds of a pint. This should then be carefully strained.

Oatmeal Water.—To a pint of water, add two or three teaspoonfuls of well-cooked oatmeal porridge, bring it just to the boiling point while it is being gently stirred ; when the whole mixture is quite smooth, strain it.

RICE WATER.—An ounce of the best rice should be well washed in cold water. It should then be steeped in a quart of water, and kept just warm for two or three hours. The whole should then be boiled slowly for one hour, and then carefully strained.

LIME WATER.—Take a piece of unslaked lime as large as a walnut, drop it into two quarts of pure filtered water contained in an earthen vessel; stir thoroughly, allow to settle, and use only from the top, replacing the water, and stirring as consumed.

It is sometimes convenient to use a more concentrated form of lime water than the liquor calcis of the Pharmacopœia. It is useful to remember, for this purpose, that a teaspoonful of the liquor calcis saccharatus to four tablespoonfuls of water gives a solution of nearly the same strength.

A simpler way, perhaps, is to add the saccharated lime solution direct to the food. For instance, to a feed of eight tablespoonfuls of milk, or milk and water, fifteen or twenty drops of liquor calcis saccharatus may be added. (Goodhart and Still.)

ARROWROOT WATER.—A pint of cold water should be put over two teaspoonfuls of the best arrowroot; this should be well stirred, and allowed to simmer for five minutes.

LINSEED TEA.—Add two tablespoonfuls of linseed, and a quarter of an ounce of bruised liquorice root, or a piece of liquorice as big as a filbert, to a pint of water. Sweeten to taste. Boil for half an hour, then strain. (Cautley.)

LEMONADE.—Take a washed lemon and pare the rind off thinly, then cut the lemon into slices. Put the parings and slices into a jug with one ounce of white sugar, and pour over them one pint of boiling water. Cover the jug, and allow to cool, and, when cold, strain. If it is preferred that effervescing

lemonade be taken, the cold lemonade, made as above, may be put into a large tumbler, a little bicarbonate of soda added, and the whole rapidly stirred.

Imperial Drink.—This useful diuretic may be prepared simply as follows:—Dissolve a large teaspoonful of cream of tartar in one pint of boiling water, add a little sugar, and a little lemon for flavouring. When cold the whole should be strained. Another method of preparing Imperial Drink is as follows:—

Acid potassium tartrate -	1 ounce.
Tartaric acid - - -	1 ounce.
Oil of lemon - -	12 minims.
Refined sugar - - -	16 ounces.
Boiling water - -	1 gallon.

Diet in Chorea.—For the diet for children suffering from chorea, which is being treated by massage, Dr. John Phillips has worked out the following treatment:—

At 5.30 a.m. the child should take half a pint of warm milk; at 7 a.m., half a pint of milk and three slices of bread and butter, each about one ounce in weight. At 9.45 a.m., half an ounce of Kepler's Malt Extract in lemonade; at 10 a.m., the child should be massaged for from 15 to 20 minutes. This should be followed by half a pint of warm milk. At 12.30 p.m., rice pudding, half a pint of milk, green vegetables and potatoes; at 4.15 p.m., half a pint of warm milk, three slices of bread and butter, and an egg lightly boiled; at 7 p.m., half an ounce of Kepler's Malt Extract in lemonade; at 7.30 p.m., massage for about a quarter of an hour, followed by half a pint of milk. At the end of ten days, or a fortnight, the bread and butter is to be increased to four slices at 7 a.m. and 4.15 p.m.; a lean chop is to be added to the mid-day meal, and an extra pint of milk distributed over the twenty-four hours.

Cases for Commentary in the February Number.—Case I. was that of a woman, 25 years of age, who was suffering from hemiplegia down the right side; the whole of the

face, however, was not affected, which indicates that the upper part was normal. There was also motor aphasia. The attack was of sudden onset, and the patient was quite unconscious, though she recovered from this condition later. The cause of the condition was embolism of the left middle cerebral artery, followed by thrombosis. The age of the patient was certainly against the cause being cerebral hæmorrhage ; and the suddenness of the onset, together with the absence of premonitory symptoms, helps to exclude the cause being primary cerebral thrombosis.

Case II. was that of a male, aged 50, who, from the history given, was suffering from old-standing stricture of the urethra, with acute prostatitis and cystitis, which increased. The inflammation spread to the peritoneum, and the cause of death was septic absorption. On post-mortem examination a stricture was found in the urethra, with evidence of false passages previously made. The prostate was much enlarged. The bladder wall was thickened, and the mucous membrane inflamed, and there were phosphatic deposits in it. The ureters were tortuous, the walls thickened, and the lumen somewhat dilated. The pelvis of each kidney was slightly dilated, and there was some consecutive nephritis, with thinning of the kidney substance.

Notes by the Way.

The Food Question.

At the present day one can scarcely sit down to luncheon at a club, or dine out, without the talk inevitably drifting to diet. Nearly every one is on some system or pins his faith on some patent food. In every case as to which he is consulted the doctor is importuned to lay down a scheme of diet, and sometimes he is at a loss how to comply with the request. Medical opinions differ on this as on other points, and no very definite guidance is found in the text-books. It has seemed to us, therefore, that it would be useful to collect in one number of The Practitioner the fruits of the ripe knowledge and experience of men who are justly regarded as entitled to speak with special authority on the diet appropriate to various morbid states. In this Special Number, accordingly, will be found a series of articles which cover the whole ground of dietary in disease. Dr. Noël Paton gives an exhaustive review of the physiology of dietetics. Dr. Robert Hutchison discusses the subject from the therapeutic point of view. Dr. Luff says all there is to be said about diet in gout, rheumatism, and allied conditions. Dr. Allchin tells how, by accurately adapted diet, persons who like Falstaff have more flesh, and therefore more frailty, than other people, can be saved from dying of their own too much. Dr. Hector Mackenzie treats of feeding in wasting diseases; Dr. R. T. Williamson of the vital matter of diet in diabetes, and Dr. Rose Bradford of the alimentary treatment of Bright's disease. Diet in affections of the stomach and liver is dealt with by Dr. Habershon, and that of intestinal disease by Dr. Sutherland. Dr. Aldren Turner writes on the nature and quantity of food suitable in diseases of the nervous system and in asthma. Dr. Newton Pitt discourses on the dietetic management of acute diseases, fevers, &c. Sir Dyce Duckworth embodies the fruits of a very exceptional experience in an article on diet in diseases of the heart; Professor Simpson brings his special knowledge to bear on the subject of feeding

in tropical disease, and Mr. Malcolm Morris sets forth what little is known about diet in affections of the skin.

The number is in fact a monograph on what has now come to be recognised as one of the most important departments of therapeutics, and it is hoped that the practitioner may find help in it, should the problem of diet at any time give him trouble.

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Genius in the Profession of Medicine.

THE most startling part of Sir Frederick Treves's address as Lord Rector of the University of Aberdeen was his exclusion of genius from the list of factors which make for success in medicine. Yet it requires but a little reflection to acknowledge that in this contention he was absolutely right. The Muse of Medicine is emphatically pedestrian; she has no wings, but must pick her steps slowly and carefully among the stones of stumbling that lie strewn along her path. Intuition is not for her; she must laboriously gather facts and reason upon them, making many mistakes before she arrives at truth. Beau Brummel's valet was met one day coming downstairs with an armful of crumpled neckcloths, of which he said: "These are our failures." The same thing might be said of much scientific work; the world hears only of an infinitesimal fraction of its many "failures." Dogged determination is essential in medical practice, and that is a quality that is almost imcompatible with genius. As Sir Frederick Treves says, the nervous organisation of the genius is sensitive; it responds vividly to impression and is alert in its reflex movements. The stimuli it receives become rapidly diffused, producing results which are often bizarre, disorderly, and unexpected. The genius, if quick in perception, is uncertain in action. Now, uncertainty in action is one of the greatest obstacles to success in a profession in which a man who cannot be depended on is utterly out of place. This is not the first time Sir Frederick Treves has uttered these views. In the *Young Man* for December, 1904, there appeared some hints from him to those thinking of entering the medical profession, in which he said genius is some sort of neurosis. He added that the few men of genius he had met

were exceedingly impossible persons, and altogether out of place in the medical profession, where even cleverness was not to be encouraged. This is a hard saying, but it appears from the context that Sir Frederick Treves used the word with special reference to so-called "brilliant" surgery.

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Factors of Success in Medicine.

His further remarks on the subject, and the examples with which he illustrated his text, are so interesting that we do not think we need make any excuse for quoting them at length:—"No person succeeds better than the man who stands entirely upon his own feet, depending on no one to assist his progress. The absence of means is another ground of lamentation; but the men who have succeeded most conspicuously are the men who started on nothing. The things that made for progress are difficult to define. Hard work comes first. Then there must be close observation. Of course, too, a man must know his profession. As Sir William Jenner put it, 'He must be in a position to be dogmatic.' There are two classes of dogmatic persons—those who know everything, and those who know nothing, of a subject. Again, a man must be kind. It is not kind to blurt out to a lady the news that she has a malignant disease. The last quality to a successful medical man is honesty, and it cannot too emphatically be laid stress upon. The late Sir Andrew Clark was a man who had no knowledge of dulness, and an infinite capacity for work. He was a particularly shrewd observer, amusing in his dogmatism, a man than whom none had a kinder heart, and almost pedantically honest. Sir Andrew started without money, friends, or influence, and he rose to the highest position in his profession."

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Mental Reservation.

Sir Frederick Treves's reference to the brutality of telling a lady bluntly that she has cancer opens up a most important question of medical ethics. He had something to say on the subject in his Aberdeen address, in which he spoke of the need of sympathy that would enable the doctor to put himself in the patient's place, and conceive of a disease not only as his art shows it to him, but as it appears to the view

of his patient. As an instance, he cited the proposition that blunt, outspoken truth is always commendable. If, he went on to say, the bald truth were always uttered, the gentle fabric of social life would crumble to the ground in a day. Sir Frederick holds that the wind of truth should be tempered to the shorn lamb. There can be no doubt that this view is sound. Some mental reservation is necessary in certain cases, unless the doctor thinks himself imperatively called to do murder for conscience' sake. Yet there are some austerely righteous persons in the profession who repudiate with horror the suggestion of mental reservation which they associate with "Jesuitry," that is supposed to be abhorrent to the British mind. In the discussion of this question, we should begin by following the advice of that virile moralist, Samuel Johnson, and clear our minds of cant. We must frankly acknowledge that medical practice is built mainly on probabilities. Have we any right to dash away the cup of hope from the lips of a poor wretch whom it may be the means of saving, unless we are certain that his case is hopeless? And can we ever be certain of this? We would go further and say that, even if certitude is attainable, we are not called upon to tell the sufferer (as we have known a surgeon to do) that the sooner he makes his will the better. A man sick unto death ought assuredly to be told that he should put his affairs in order. But this ought not to be done so roughly as to "shake the dying sinner's sand," and hasten the catastrophe which it is the business of the doctor to use every resource of his art to postpone.

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What is the Practice of Medicine?

Is there any authoritative legal definition of what constitutes medical practice in this country? We rather think not, since anyone is at liberty to practise the art of healing provided he does not give himself out to be a legally qualified practitioner. In the draft of the Medical Acts Amendment Bill, which is being promoted by the British Medical Association, an epitome of which was published in the Supplement to the *British Medical Journal* of May 27, 1905, the expression "medical treatment" is said to include "the application of any real or pretended art, science, method or system

relating to the prevention, cure, or alleviation of any disease or defect, or injury to the human body, and the performance of any surgical operation." This is sufficiently comprehensive; but the Bill has not yet become law, and we venture to think it has very little chance of getting on the Statute Book—except perhaps after undergoing drastic "sterilisation" —in the lifetime of the present Parliament. In other countries the legal pronouncements are so vague as to make conviction for unqualified practice always very doubtful. In Paris, not long ago, the legal mind was greatly perplexed by the case of a spiritist healer. As he had never prescribed any medicines, and his treatment consisted wholly of passes and the evocation of spirits, oracles were divided as to whether he came within the scope of the law. It appears, however, that in a previous case the Cour de Cassation decided that magnetic passes were therapeutic agents, and on this the "healer" was condemned. In the United States contradictory definitions have quite recently been given. In the New York Court of Special Sessions, in the case of an osteopath, prosecuted by the County Medical Society and fined, a dissenting opinion was given by Justice Joseph M. Deuel. It may be mentioned that the Judge's name lately figured in a libel action, out of which he did not come with flying colours. Yet he is a judge, and, we have no doubt, "a good judge too," as the chorus sings in *Trial by Jury*. This ornament of the Bench holds "that the practice of medicine consists of three things —diagnosis, discovery of the cause of illness, and its cure by drugs; and that if a doctor does not prescribe drugs he is not practising medicine." In his view the law against illegal practice is aimed at "the ignorant and indiscriminate administration of drugs and lotions." We learn from the *Boston Medical and Surgical Journal* that a very different definition has since been given in another court by Judge Joseph I. Green. After stating that he had searched the authorities of the State in vain to find a definition, he said:—"The practice of medicine is the exercise or performance of any act by or through the use of any thing or matter, or by things done, given, or applied, whether with or without the use of drugs or medicines, and whether with or without fee therefor, by a person holding himself or herself out as able to cure

disease, with a view to relieve, heal, or cure, and having for its object the prevention, healing, remedying, cure, or alleviation of disease." Before giving his definition the Judge said :— "The court has examined the definitions which appear in the various dictionaries, both as to what is meant by the word 'medicine' and what is meant by the term 'practising,' and, having in mind the object of the statute, the court has undertaken to charge in this case what the court deems to be the practice of medicine within the meaning of the statutes and the meaning of the law in this State." The case, which was the occasion of this important deliverance, began nearly four years ago, when the New York County Medical Society took proceedings against a woman, who advertised in the papers that she could cure acute and chronic disease. Her treatment consisted of manipulation of the spine and general massage, and she accepted a fee of two dollars from several agents of the society who were sent to her as patients. When sufficient evidence had been secured against her she was arrested, and held for trial in the Court of Special Sessions, but when the case came up the defendant was discharged on the ground that it was not proved that she had given any drugs. She was ill-advised enough to bring an action against the society for malicious prosecution in the City Court, where, on the strength of Judge Green's charge, the case was decided against her.

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Themis and Æsculapius.

It is always gratifying to record cases in which the prosecution of quacks has been successful, or a doctor has obtained justice in a court of law. It must be admited that the relations between the medical profession and the law have not always been examples of that heavenly harmony from which, according to the poet, this universal frame began. There have, indeed, been cases which have seemed to warrant the belief that justice in this country is particularly blind when the interests of medical practitioners are concerned. There have even been judges whose manner towards medical witnesses and general way of dealing with the profession have laid them open to the suspicion of anti-medical bias. When any particularly flagrant miscarriage of justice occurs, we try to

comfort ourselves by echoing the sentiment of the celebrated parochial officer that the law is "a ass, a idiot," but that reflection unfortunately does not compensate for waste of time and loss of money, and possibly of professional character that may be entailed on the most innocent by an action at law. There is no natural antagonism between Themis and Æsculapius, but the fact remains that if a judge has a chance of browbeating a doctor he seldom fails to take it, and if a medical witness in a police court can be swindled out of his proper fees by any trickery, he is looked upon as lawful prey by those whose business it is to pay them.

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Tuberculosis and Occupation.

SOME very interesting researches on the relation of tuberculosis with occupation have lately been published by Drs. Legendre and Plicque. Statistics as to trades which expose those who follow them to direct infection, such as washerwomen, housebreakers, hospital nurses, and medical practitioners, yield somewhat conflicting results; in all of them, however, the influence of long-continued or repeated infection is manifest. Laborious occupations which lead to exhaustion predispose to infection; and the tendency is increased by dissipation. Avocations which have to be pursued amid whirlwinds of dust or for long hours in small, ill-ventilated courts or workshops strongly predispose to tuberculosis; owing to this cause, consumption levies a large tribute on barristers, teachers, singers, brass-founders, seamstresses, &c. A curious point, which is brought out by the figures collected by MM. Legendre and Plicque, is that an inadequate income is a predisposing cause of tuberculosis; it is often observed that fathers of families, who have to struggle for a living, suffer much more than unmarried men who receive lower wages. The most deadly trades of all are those in which workers are surrounded by temptations to drink; consumption finds a large number of victims among waiters, publicans, and others who deal in alcoholic liquors. How close is the connection between alcoholism and tuberculosis is shown by Brouardel's estimate that drink is responsible for the larger proportion of the cases of phthisis in the Paris hospitals.

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In the Shadow of Death.

In his little book *Science and Immortality*, Professor Osler says that as a rule man dies as he has lived, uninfluenced practically by the thought of a future life. He says he has careful records of about five hundred death-beds, studied particularly with reference to the modes of death and the sensations of the dying. Ninety of the persons suffered bodily pain or distress of one sort or another, eleven showed mental apprehension, two positive terror, one expressed spiritual exaltation, one bitter remorse. The great majority gave no signs one way or the other. This probably corresponds with the experience of most doctors. The senses are mercifully darkened as the pall of death is drawn over the traveller about to pass into the undiscovered country, and he drifts on "through slumber to a dream, and through a dream to death." Yet many retain their senses to the end, and in scientific men in particular the ruling passion has been strong to the last. Of Joseph Henry Green it is related that when his doctor entered, he said, pointing to the region of the heart, "Congestion!" After this he set his fingers to his wrist and noted the gradually weakening beat of the pulse. At last he said, "Stopped"; and that was the end. Trousseau died with his hand in his daughter's; he told her that as long as he could press it he would do so, and that when the pressure ceased he would have gone he knew not where. Even those who fear death before they pass into its shadow generally cease to be afraid when the end comes. There is apparently good reason to believe that death by falling from a height is not painful, and drowning has been described by some who have been rescued when virtually dead as not unpleasant. Except in rare cases the "agony" of death is a myth.

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Competitions.

The result of the Competition for February is as follows:—The best essay was sent by Dr. Bullock, of Notting Hill; and the best answers to the questions by Dr. D. T. Barry, of Cork. Cheques have accordingly been sent to these gentlemen.

COMPETITIONS.

WE offer our readers every month two Prizes on the conditions stated below.

A Prize of Two Guineas will be given to the author of the best Essay on a subject to be announced by the Editor.

A Prize of One Guinea will be given to the competitor who writes the best answers to three questions relating to Medical or Surgical Cases.

Results of the March Competitions will be announced in the May number.

a.—The Subject of the Essay for April will be

The Treatment of Hæmorrhoids.

b.—Answers to the following questions are invited :—

1. What are the drugs which produce rashes? What rash occurs in each case?

2. What are the changes which occur in the blood in Leucocythæmia?

3. A male, aged 40, was admitted to hospital suffering from great dyspnœa and subcutaneous emphysema. The history was as follows :—For the last five months he had suffered from a cough, and three months previously, he had "brought up" half-a-cupful of bright red blood. Just before admission a similar thing occurred, only to a smaller extent. The cough, which was paroxysmal, had been getting much worse. The night before admission, the cough was exceedingly bad, and, under the strain of coughing, his neck began to swell. The chief physical signs were :—Emphysema over the front and back of the chest, extending, on both sides, up to the neck, chin and face. The lung sounds appeared to be normal, the heart sounds were normal, but the apex beat was displaced to the left; the pulse was regular, 72 per minute; respirations, 32 per minute, with orthopnœa. He had violent spasms of coughing, during which his face became cyanosed, he vomited some milk, and expectorated frothy material. During the next five days, the emphysema gradually diminished; the temperature varied between 99° and 101°. The pulse rate between 90 and 100, respirations were 34 to 40 per minute. By this time, there was observed a dull area at the base of the back of the right lung, extending up to the level of the ninth rib. Above this level, the right lung was hyper-resonant. Rhonchi appeared over both lungs, but no sound was heard over the right base. During the next two days, the dulness extended one inch higher, a needle was inserted, and thick pus was withdrawn.

Breathing became more laboured, the congestion of the face and extremities was greater, and the general condition of the patient much worse. The next day he was "in extremis," so that, under cocaine, an incision was made under the ninth rib through the pleura, when a large quantity of foul-smelling pus with gas escaped. The pus contained some casein. A finger was inserted into the cavity, and the diaphragmatic surface of the pleura was felt to be thick and rough. The pleura covering the base of the lung was also thickened for about three inches up. The cavity was gently irrigated, and a glass drainage tube inserted. The same night, the pulse rate was 120; the patient became gradually worse and died.

What is your diagnosis of the case?

GENERAL CONDITIONS.

A.—All MSS. relating to the Essay must be marked on the top left-hand corner "Essay," and must be sent to the Editor of THE PRACTITIONER, 149, Strand, W.C., on or before the 1st day of May 1906. The answers to the above Questions must not exceed eight hundred words.

B.—All MSS. giving answers to the Questions must be marked on the top left-hand corner "Questions," and must be sent to the Editor on or before the 1st day of May, 1906.

C.—No Essay will be returned unless a special request is made, accompanied by a stamped addressed envelope.

A and B.—(1) One side of the paper only must be written on.

(2) The name, or pseudonym, and address of the competitor must be clearly written on each sheet of paper used.

(3) The decision of the Editor is final.

(4) Competitors must be registered General Practitioners.

(5) The attached Coupon must be filled up by each competitor.

THE PRACTITIONER.

MAY, 1906.

COMPULSORY RE-VACCINATION: A SOLUTION OF VEXED QUESTIONS RELATING TO SMALL-POX.[1]

By SIR JOHN MOORE, M.D., D.P.H., B.A. (Dubl.), D.Sc. (Oxon.) (Hon. Causa), F.R.C.P.I.,

Physician to the Meath Hospital and County Dublin Infirmary; Professor of Practice of Medicine in the Royal College of Surgeons in Ireland.

So long as a community remains susceptible to small-pox the supposed aërial convection of the virus or poison of that dread disease and the isolation of small-pox patients are questions which must have a very lively interest for the public as well as for the medical profession.

The conflicting evidence given by medical experts on the question of the aërial convection of the *materies morbi* of small-pox has seriously influenced important legal decisions within the past few years.

In February 1904, a case bearing on the subject of the danger of a small-pox hospital to the surrounding community came before the Chancery Division of the High Court of Justice in England, Mr. Justice Farwell presiding (The Attorney-General *v.* The Mayor and Corporation of Nottingham).[2]

This was a "Quia timet" action to prevent the defendant Corporation from using as a small-pox hospital a building which they had recently erected in the parish of Bulwell within the borough of Nottingham, on the ground that the hospital was both a public and a private nuisance. The hospital premises were within half a mile of Bestwood Collieries, and within a quarter of a mile of certain ironworks. The hospital itself was within 17 yards of a public road. In addition, a considerable number of people either lived or worked within a short distance of the hospital premises. The

[1] Read before the Section of Medicine in the Royal Academy of Medicine in Ireland.

[2] *The Law Reports o the Incorporated Council of Law Reporting*, 1904, Vol. I. p. 673, *et seq.*

plaintiffs were the Attorney-General at the relation of several owners and occupiers of land and collieries in the parish of Bestwood. They alleged that the maintenance and use of the hospital caused grave danger of the spread of infection, and they claimed an injunction accordingly. The hospital accommodated from 30 to 40 patients. Expert evidence was given on both sides. The principal witnesses for the plaintiffs were Dr. Thresh, Medical Officer of Health to the Essex County Council; Dr. Chalmers, Medical Officer of Health for Glasgow; and Dr. McVail. For the defendants were Dr. Boobbyer, Medical Officer of Health for Nottingham; Dr. Hope, Medical Officer of Health for Liverpool; and Dr. Reid, Medical Officer of Health to the Staffordshire County Council.

The Judge found, as the result of the evidence, that the site of the defendants' hospital was carefully chosen, was in a proper situation, and constituted no appreciable danger to the public health, and no nuisance to the relator plaintiffs' property. On the question of the aërial dissemination of small-pox, the expert evidence was equally balanced for and against, and Judge Farwell agreed with Lord Justice Bowen's opinion in another small-pox hospital case, that it is no part of the functions of the court to qualify itself as an expert in science. The court acts on the opinion of experts whose qualifications can be tested by cross-examination, and weighs the evidence so given and tested. The result was that the action failed, and was dismissed with costs, the question of the actual danger of a small-pox hospital remaining legally undecided.

To quote one other case nearer home, the action of the Attorney-General for Ireland *v.* The Urban District Councils of Rathmines and Pembroke was tried in the Dublin High Court in 1904 before the Right Hon. Hedges Eyre Chatterton, the then Vice-Chancellor.[1] The Urban District Councils in question had established in February 1902 a Joint Isolation Hospital for small-pox and other infectious fevers at Vergemount, Clonskeagh, Co. Dublin. The site selected was in a populous neighbourhood, and abutted on public and private roads and on an electric tramway. There was a population of 753 persons within a quarter of a mile, and a population

[1] *The Irish Reports*, published under the control of the Incorporated Council of Law Reporting for Ireland, 1904, Vol. I., Chancery Division, p. 161, *et seq.*

of 2,682 within half a mile, of the proposed site. An injunction was granted.

Against this decision the District Councils appealed, and, on hearing the case, the Court of Appeal reversed the Vice-Chancellor's judgment, and quashed the injunction. This was largely due to the conflicting medical evidence which was given. Dr. E. W. Hope, Medical Officer of Health for Liverpool, in particular testified that there was no evidence to show that the isolation small-pox hospitals in that city had in any way disseminated the disease.

In giving judgment in the appeal case, Lord Justice Fitzgibbon said that, "to sustain the injunction, the law requires proof by the plaintiff of a well-founded apprehension of injury—proof of actual and real danger—a strong probability, almost amounting to moral certainty, that if the hospital be established, it will be an actionable nuisance. . . The decision depends upon the facts proved in the particular case, with due regard to the opinions of experts so far as they are founded upon facts; but with due regard also to the decisions of other courts pronounced upon similar evidence in other cases."

The Lord Justice went on to say:—"It seems probable that the dread of small-pox is to a great extent the result of tradition; that scourge of the eighteenth century retains its terrors for those who do not realise that it has been deprived of most of its terrors. Vaccination is not only a preventive, it also modifies the disease. The evidence even of Dr. Thresh is that vaccination and re-vaccination, at proper intervals, confer 'practical immunity.' In applying the maxim *sic utere tuo ut alienum non lædas*, the duty of reasonable precaution for one's own protection is not to be ignored. An Isolation Hospital reduces the risk for every inhabitant of the district; it is, in fact, a necessity, and though the individual must be protected, the public advantage should not be forbidden, unless the danger and injury to the individual are clearly proved."

In conclusion, the Lord Justice held that the action must be dismissed on the ground that no real danger had been proved. The other members of the court concurred; they were Lord Justice Walker, now Lord Chancellor of Ireland, and Lord Justice Holmes.

Notwithstanding Dr. Hope's opinion and the judgments

I have quoted, there can be no doubt that the doctrine of the aërial convection of small-pox is widely accepted by the medical profession both at home and abroad. Writing in *Nothnagel's Encyclopædia of Practical Medicine*, in 1902, Dr. H. Immermann, of Basle, observes:—"Of the greatest importance for the epidemic spread of the disease is the fact that the contagion existing in the pock-contents is volatile (*contagium volatile*). This signifies that the specific agent possesses the power, by means of effluvia from the patient, of mingling mechanically with the surrounding atmosphere and of infecting the air to a distance. This volatility is not only a property of the contagium of small-pox, but it is so to a very high degree, and on this peculiarity rests the great danger of infection. This danger is naturally greater where many patients are crowded together and where the eruption is extensive. For a susceptible person, the danger is greatest if he comes often to, or stays long in, a small-pox locality or in the neighbourhood of a small-pox patient, while with increasing distance the 'chance of acquisition' rapidly lessens. But the vitality of the volatile variola poison is so great that pathogenic transmission of it for great distances (100 metres and over) through the open air is by no means unheard of."

This is not the place to discuss at length the question of the aërial convection of small-pox. Suffice it to say that a doctrine which was held by such a master as the late Sir Richard Thorne Thorne, and which has received support from the investigations of Mr. W. H. Power, the very able Medical Officer of the English Local Government Board, Dr. G. S. Buchanan, one of the Medical Inspectors of the same Board, Dr. John Thresh, Medical Officer of the Essex County Council, and many others, is deserving of full consideration.

During the last epidemic of small-pox in London, which began in August 1901, and continued through a large part of 1902, practically all the cases of the disease were brought by the River Thames Ambulance Service to three hospital ships of the Metropolitan Asylums Board, which were moored off the south bank of the Thames in Long Reach, opposite the districts of Orsett and Grays, in South Essex. Between

September 1901, and June 1902, these districts sustained a severe outbreak of small-pox. Throughout the period of the epidemic a large number (usually between 100 and 300) of acute cases of small-pox were under treatment on board the hospital ships. Dr. Thresh has given an account of the behaviour of small-pox in past years in the Orsett Union, and has shown that the disease has been introduced into the district at Purfleet on many occasions when the hospital ships contained notable numbers of cases of London small-pox.

Here is Mr. Power's opinion of the evidence furnished by the Orsett outbreak :—

"The operation of these ships in this way—certainly in 1901-02, if not always on previous occasions—can only be thought of as a matter of aërial transmission of infection. There was no traffic or communication whatever between the hospital ships and the northern shore. The account of this outbreak, when considered along with the data accumulated with regard to various small-pox hospitals in different parts of the country, affords an interesting illustration of the conditions which I have shown, in reports to the Board in 1886, to have occurred around London hospitals of the Metropolitan Asylums Board in former years, when these hospitals were used for the isolation of acute small-pox cases."

An important leading article on the spread of small-pox from hospitals appeared in the *Lancet* for January 12, 1906. The writer considers that the facts regarding the outbreaks of small-pox in the Orsett Union in Essex in 1901–02, and in Felling in 1903-04, are hardly capable of any other explanation than that afforded by the doctrine of aërial convection. The story of the latter outbreak, as told by Dr. George S. Buchanan, of the Local Government Board, is very striking. The urban district of Felling adjoins Gateshead, and the Gateshead Hospital is situated near the boundary line. Traffic to and from the hospital is all from Gateshead. Felling cases go to a hospital of their own, and no convenient route from the affected part of Felling passes the Gateshead Hospital, which is situated on out-of-the-way rising ground. Yet the Felling small-pox epidemic mainly attacked not its most populous part near the Tyne, but the higher and comparatively open country to the south, particularly a village

less than half a mile from the Gateshead Hospital—a village lying in the path of light south and south-west winds blowing across the hospital towards the village. The small-pox incidence on dwellings within half a mile of the hospital was about three and a half times that on the dwellings farther away, and no one of the wards in any part of Gateshead or Felling had so high a rate of small-pox as the half-mile area, the nearest approach to that rate being experienced by a Gateshead ward, which had many dwellings within a mile of the hospital.

In answer to a query addressed by me to him for the purpose of this communication, Dr. John Marshall Day, the Registrar and Resident Medical Officer of the Fever Hospital and House of Recovery, Cork Street, Dublin, writes as follows, under date February 2, 1906. It will be seen from his letter hat Dr. Day is of opinion that the facts, observed in Dublin in recent outbreaks of small-pox, point to the dissemination of the disease by "contacts" and fomites (or infection carriers) rather than through the atmosphere (aërial convection):—

"The reason we ceased to admit cases of small-pox was that the Irish Local Government Board, impressed by the the aërial convection theory, came to the conclusion that Cork Street, being in the city, was not a suitable place for the treatment of that disease, and urged this view on the Corporation. The latter body finally settled on the Pigeon House site as the best and most suitable they could obtain. I believe the Local Government Board based their opinion on the admirable report of the late Sir Richard Thorne Thorne.

"In 1887–8 we treated and stamped out an outbreak of small-pox, which, fortunately, was limited to twenty persons. In 1892 there were two cases. In 1893 one case. In 1894–95 there were 796 cases. In 1895–96 there were 216 cases. In 1896–97 two outbreaks occurred, embracing three or four cases respectively. Since 1897 we have had isolated cases of small-pox in the hospital and at Beneavin, the Convalescent Home of the Hospital at Glasnevin, Co. Dublin, but no considerable outbreak.

"In the years 1894-96, although the numbers were so high, we did not find any difficulty in preventing the spread

of the disease to the other patients, although in many cases we did not re-vaccinate them—a practice which was put in force only during the latter part of the epidemic.

"Some of the non-variola cases developed the disease after admission, but in all such cases we were able to trace the source of infection to outside causes—for example, coming from infected houses, contact, &c. In one case—that of a scarlatina convalescent — there was direct contact through disobedience of the patient. This patient was sent back to us a fortnight after leaving with small-pox. During the last epidemic we traced all the cases to direct contact with the infected area or with infected clothes. In the 1887–88 outbreak we also traced all cases to direct contact, although several of the cases were admitted from localities that were free from infection."

"There is no doubt that the last epidemic was stopped by the vigorous action of the sanitary authorities, who isolated the sick, segregated the 'contacts,' re-vaccinated wholesale, and paid frequent house-to-house visits in the infected areas."

"We shall not in future admit any case of small-pox, as the Isolation Hospital at the Pigeon House will admit all cases occurring in the city as well as in the districts of the North and South Dublin Rural Councils."

The English and Irish Local Government Boards have, not without reason, practically accepted the doctrine of the aërial convection of small-pox as proved. For some years the English Board, at all events, have framed their regulations for the hospital treatment of the disease accordingly. The following is an extract from the memorandum of the Local Government Board for England "On the Provision of Isolation Hospital Accommodation by the Local Authorities (1902) :—

"*Hospitals for Small-Pox.*—In view of the frequently-demonstrated liability of small-pox hospitals to disseminate that disease to neighbouring communities, and in order to lessen the risk of such occurrence, the Board require the following conditions to be complied with in the case of small-pox hospitals provided by means of loans sanctioned by them :— (1) The site must not have within a quarter of a mile of it either a hospital, whether for infectious diseases or not, or a

workhouse, asylum, or any similar establishment, or a population of as many as 200 persons. (2) The site must not have within half a mile of it a population of as many as 600 persons, whether in one or more institutions, or in dwelling-houses. (3) Even where the above conditions are fulfilled, a hospital must not be used at one and the same time for the reception of cases of small-pox and of any other class of disease."

These regulations—everyone of which, by the way, is violated in the case of the Clonskeagh Isolation Hospital, above alluded to—have caused great difficulty in providing hospital accommodation for small-pox in England. This difficulty does not exist in Germany. Hear Mr. W. H. Power on this point[1]:—

"Disappearance from Germany of epidemic small-pox is a fact altogether without question. For more than a generation —ever since Germany adopted compulsory vaccination and re-vaccination—sanitary administration in that country has been practically untroubled by this disease. This freedom of Germany from small-pox has, it is asserted by objectors to vaccination, been due less to universality of acceptance of primary, succeeded by secondary, vaccination than to prompt systematic and vigorous isolation of each small-pox case as it arose."

In the circumstances the Right Hon. Walter H. Long, who was at the time (1903) President of the Local Government Board for England, determined, partly in the interests of science, but mainly in reference to administrative and financial considerations, to ascertain through the Medical Department of the Board what in the present is the German method of dealing with small-pox outbreaks. Accordingly, Dr. R. Bruce Low, one of the Board's Assistant Medical Officers, having been furnished by the Foreign Office with necessary credentials to the German Government, visited Germany in the autumn of 1903, and made inquiry in certain representative towns of the chief States of that country as to current methods of suppressing small-pox.

In his report on the arrangements in Germany for the isolation of small-pox patients, Dr. Low gives, for purposes of

[1] "Report of the Medical Officer for 1903-4," *Thirty-third Annual Report of the Local Government Board*, p. xxxv.

comparison, the number of recorded deaths from small-pox in that country and in England and Wales during the twelve years 1891 to 1902 inclusive. In Germany, with a population of 56,367,178 in 1900, 607 deaths from small-pox were recorded in the twelve years. In England and Wales, with a population of 32,526,075 in 1901, the deaths from small-pox in the same twelve years numbered 6,761. Had the mortality from small-pox been as low in England and Wales as it was in Germany, only 352 deaths would have happened in the twelve years—in other words, 20 people died in England and Wales of an absolutely preventable disease for every one victim of the same disease in the German Empire.

As a result of his investigations, Dr. Low ascertained that the machinery, preventive and other, for dealing with small-pox in Germany comprises :—

(1) Compulsory vaccination of all infants before the end of the calendar year next succeeding that of their birth ; and *compulsory re-vaccination* of all children in their twelfth year ; compliance of parents with the above requirements as to vaccination and re-vaccination being enforced by fine or imprisonment.

(2) Notification of all cases of small-pox.

(3) Powers to isolate in hospital cases of small-pox or of suspected small-pox.

(4) Vaccination or re-vaccination of the "contacts" in small-pox-invaded houses, and, in some towns, isolation of such contacts.

With reference to measures of isolation, Mr. W. H. Power informs us that, as Dr. Low ascertained, no specially provided small-pox hospitals exist in Germany, save in rare instances. In fact, owing to the system of vaccination and re-vaccination there in force, the demand made by small-pox upon isolation accommodation is so trivial that in the majority of places one of the pavilions of the "General Diseases Hospital" within the town has sufficed in all ways for dealing with small-pox emergencies.

Now and again, it is true, Dr. Low found a single pavilion nominally allotted for small-pox ; but almost invariably such pavilion was, in the absence of small-pox, used for the other and general purposes of the hospital establishment.

Further, it appeared that such small-pox pavilion, even when in use for small-pox, was in most instances allowed to remain, administratively as well as structurally, one with the hospital establishment of which, in ordinary circumstances, it constituted a part. Similarly, it is not deemed needful in Germany, when small-pox is being accommodated in a section of a local hospital, to require re-vaccination of the hospital staff or of the "general" patients in the establishment, reliance against spread of the small-pox being placed on the routine statutory primary vaccination and re-vaccination that these persons have already undergone. Persons, however, who are of necessity brought into near and sustained relations with the small-pox patient, or patients in the hospital, have to submit to a further vaccination.

An excellent illustration of the trifling expense and trouble to which Germany is put in the matter of isolation of small-pox is afforded by Berlin, with a population of near upon two million persons. For this city the sole provision for small-pox is a pavilion, containing twelve beds, at the Royal Charité Hospital, which can accommodate at one and the same time some 1,500 patients suffering from a variety of maladies, medical, surgical, and other.

So far as Dr. Low was able to find out, and he was careful to make special and detailed inquiries on the subject, no serious inconvenience has at any time attended the method of small-pox isolation now adopted by Germany. Furthermore, it appears that all the officers and physicians with whom Dr. Low conferred on the matter were unanimous in attributing the immunity from small-pox enjoyed by the population in the neighbourhood of small-pox pavilions in Germany to the systematic enforcement or statutory vaccination and re-vaccination. But for this antecedent precaution, all those persons agreed it would be necessary to establish, outside the town limits in each instance, a small-pox hospital, distinct and separate from the local hospital provided for "general" disease.

Some five-and-twenty years after the introduction of vaccination, the increasing occurrence of small-pox and varioloid among vaccinated individuals shook to its foundation the doctrine, held by Jenner and the pioneers of vaccination,

that the vaccine disease conferred a life-long immunity against small-pox. Immermann shows that the re-vaccination movement had its beginning in the year 1824, and received decided impetus from the severe epidemics of small-pox which raged throughout the greater part of Europe in the following years down to 1833. To the States of the German Confederation belongs the credit of making re-vaccination compulsory in the army. The Würtemberg Government gave orders in 1829 that all recruits, without exception, must be re-vaccinated. This obligation was enforced by law four years later. Prussia followed only one year afterwards with a similar law (1834); then came Hanover (1837), Baden (1840), Bavaria (1844), and in succession the other smaller States.

Shortly after the terrible Franco-Prussian War broke out in the summer of 1870, small-pox appeared and soon spread over the greater part of Europe as a virulent and persistent pandemic. A notable exception to the widespread diffusion of the outbreak was afforded by the troops of the German Army, in which the number of individuals attacked and the mortality of the disease were markedly less than among the remaining population of the Continent. The French Army, on the other hand, suffered frightfully from small-pox, and, in fact, contributed largely to the dissemination of the disease among the nations of Europe. The absolute mortality from small-pox in the French Army was nearly fifty times greater than that of the German Army, and the ratio of deaths to all the cases was at least twice as great.

A very marked, though less striking, difference was observed in the mortality from small-pox as it affected the army and the civil population of Germany.

On the favourable results of systematic compulsory re-vaccination in the German Army, the medical profession based a demand for a general Vaccination Law to be enforced throughout the newly-constituted German Empire. And so the "Imperial Vaccination Law" of Germany was approved by the Reichstag, April 8, 1874, and took effect April 1, 1875. Since the latter date there has been no great epidemic of variola in Germany, although cases of small-pox have occasionally been observed upon the exposed frontiers of the Empire. As regards re-vaccination, this great Statute requires

that every pupil in public or private schools shall be re-vaccinated when twelve years of age if he or she has not had small-pox within the previous five years. If the re-vaccination is unsuccessful, it is to be repeated in the following year.

The law originally allowed the use of human vaccine lymph, lymph from an original case of vaccine disease, and bovine lymph from an artificially-transmitted vaccinia. When serious objection was urged to human lymph and retro-vaccine lymph on the ground of a possible transmission of syphilis, it was enacted in 1885 that the use of pure animal lymph should be gradually adopted. Now that the State Institutions for the production of vaccine lymph are able to supply the necessary quantity of pure bovine lymph, the legitimate and regular form of vaccination and re-vaccination in the German Empire to-day is by pure animal virus. Immermann says[1]:—"It might have been supposed that European countries generally would either have followed the good example of Germany, or have been stimulated to the production of still better legislation. Nothing of the kind has occurred, however, and at the present time Germany alone enjoys comparative immunity from variola."

[1] *Loc. cit.*, p. 186.

THE TREATMENT OF DYSPEPSIAS AT MINERAL SPRINGS.

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The great prevalence of disorders of the digestive organs and the uncertainty which so commonly attends their treatment by the usual pharmaceutical remedies naturally cause us to look with much interest on the remarkably good results so often obtained by the application to their treatment of the methods and resources employed at various mineral springs. But in order to obtain these good results in individual cases we must be in a position to establish clear and precise indications as to the most suitable mineral spring for each case, and we must be able to rely on the spring we select being judiciously and skilfully applied.

It is with the object of assisting those who have not had the same opportunities as we have of ascertaining and establishing these indications that this article is written.

It is to be regretted as a matter causing often much embarrassment that the local authorities at nearly every mineral spa advocate its efficacy and applicability to the treatment of dyspepsias. One reason of this is that gastric disorders so frequently co-exist with and complicate other diseases. The gouty, the rheumatic, the anæmic, the cardiac, the hepatic, the renal and the cutaneous patients may all present symptoms of dyspepsia, and these may be benefited and relieved by the mineral waters which ameliorate this co-existing and possibly the original malady; so that the advocacy of the usefulness of such springs in the treatment of dyspepsias may be quite honest and founded on actual observations. We have also to reckon with the vast group of neurotics who are frequently afflicted with, or at any rate, complain of gastro-intestinal disorders, and it is a matter of common knowledge that change of climate alone, combined with free exercise in the open air, absence from home and family worries and mental rest in agreeable surroundings will

work wonders in the restoration of their digestive functions, with or *without* the aid of mineral waters. Such patients may be found at all varieties of springs and, under the favourable conditions we have mentioned, gain benefit from all. Much also depends on the spa physician and his knowledge of human nature and the confidence he may be able to inspire. We remember hearing an American patient say, naming an eminent European spa doctor, "that it was worth coming yearly from America to the celebrated spa where he practised to have an interview with Dr. A."

It is equally true that some patients of the neurotic type bring unmerited discredit on certain spas by their wilfulness and capriciousness. We have also to take into account, in arriving at a just conclusion, the beneficial actions of those accessory measures which are now commonly applied, and with great skill and perfection, at all the important mineral springs. We refer to massage, hydrotherapy, physical exercises, electricity, &c. These important therapeutic agents are of themselves capable, when wisely and discriminately applied, of curing, or greatly aiding in the cure of many functional gastro-intestinal disorders.

An obvious difficulty in accumulating exact knowledge of the relative applicability of different spas to the treatment of different forms of dyspepsia arises from the fact that those medical practitioners who are devoted to hydro-mineral treatment nearly always confine their observation to one particular spa, and are not, therefore, able to establish a *comparative* estimate of the range or limitation of applicability of *various* mineral springs; this can only be done, and then imperfectly, by those who have had the opportunity of comparing the results observed at different springs in the same class of cases.

The usual *classification* of mineral waters does not greatly help us, as all the classifications are extremely artificial, as we have pointed out elsewhere,[1] and afford little or no basis for establishing precise indications for their use and application.

In considering the applicability of different springs to the treatment of gastric disorders, the question of temperature is

[1] *The Therapeutics of Mineral Springs and Climates*, p. 5.

of real importance, and plays an essential part in differentiating the use and suitability of different waters to particular cases. It is fairly well established that the *cold* waters are the most stimulating to the gastric secretion, the *hot* springs less so, and the *warm* or *tepid* springs least of all. The *hot* springs have also the property of relieving painful nervous and spasmodic conditions of the alimentary canal, and are, therefore, indicated in neuralgic affections of the stomach and intestines. The *warm* springs should be preferred to the *cold* in cases of gastric hyperacidity (the *hyperchlorhydrie* of French writers), cases of gastralgia, gastric spasm, and hyperæsthesia, and in cases of pyloric spasm and nervous vomiting. The *cold* springs are more suited to cases of feeble digestive power from insufficient secretions (the French *hypochlorhydrie*), yet at Vichy where they have the choice of many springs, varying in temperature, the *tepid* water of the *Hôpital* spring is preferred to the *cold Celestins* in treating these cases. It is also advisable when the cardiac action is feeble to avoid the *cold* springs at the beginning of the course. Also in cases in which it is desired to produce a *sedative* action on the *nervous* system, it has been noted that the *natural* warm springs act much better than cold springs that have to be artificially heated.

In selecting a resort for the dyspeptic, the *alkaline* waters may be first considered—they take the first place in the treatment of dyspeptic conditions. For our present purpose we may take Vichy and Vals in France, and Neuenahr, Fachingen, and Bilin in Germany, as the chief examples of this class of alkaline springs. In all of these their alkalinity is due to the presence of sodium bicarbonate. Some French authors include, in this group, waters that owe their alkalinity to the presence of calcium and magnesium bicarbonate as Pougues in France and Wildungen in Germany, but we do not consider these springs of any real importance in the treatment of dyspepsias. The simple alkaline springs we have named contain also more or less free carbonic acid—some of the Vals springs are especially rich in this gas, *e.g.*, the Magdaleine and the Précieuse springs. The Neuenahr springs contain much free carbonic acid, as does the adjacent Apollinaris spring; indeed Apollinaris may be regarded as a cold

Neuenahr, or Neuenahr as a warm Apollinaris. The action of the free carbonic acid in these waters, according to the experiments of Jaworski, is to stimulate the secretion of the gastric juice, to augment appetite, to promote peristaltic action, and to calm irritation. Its excellent effect in allaying nausea and certain forms of vomiting is well known. These highly gaseous waters are, therefore, especially indicated in cases of atonic and nervous dyspepsia, and, on the contrary, are better avoided in cases of hyperacidity. They are remedies for *hypochlorhydrie* but not for *hyperchlorhydrie*—in the latter cases the non-gaseous alkaline springs act better.

Experimental inquiries into the effect of sodium bicarbonate on the gastric secretion have produced the most conflicting opinions from different authorities. A full and detailed examination of these views would lead us too far away from the practical purpose of this paper; a good *résumé* of them has been given recently by Professor Linossier,[1] of Lyons. We may say at once that we have never seen any reason, after many years of careful observation, to believe in an alkaline cachexia, and we are satisfied that the imagination, stimulated by preconceived or pre-accepted ideas, has had much to do in conjuring up the evils that have been said to follow the free use of sodium bicarbonate. Professors A. Robin and Mathieu have expressed themselves strongly on this point, and cases have been reported by them in which very large doses of sodium bicarbonate have been taken, for long periods at a time, not only without any evil result, but with decided advantage. Linossier says "countless observations have been reported of patients who have taken daily during months at a time from 225 to 500 grains of sodium bicarbonate with great advantage, not only from a point of view exclusively gastric, but from the point of view of their general health."[2] So experienced and learned a physician as Huchard speaks of the opponents of the use of sodium bicarbonate as "alkalinophobists!" We remember, some years ago, hearing the late Sir Andrew Clark say, that when he began practice he used frequently to prescribe mineral acids in cases of dyspepsia,

[1] *Traité des maladies de l'Estomac*, par Le Dr. Maurice Soupault, p. 754. Paris: Baillière et Fils, 1906.

[2] *Op. cit.*, p. 757

but that with riper experience he had almost entirely given them up in such cases, and he found himself prescribing more and more the alkalies. This conclusion is explained when we reflect that the great majority of dyspeptics suffer from hyperacidity, and that the mere chemical property of neutralising this excess of acid, which alkalies possess, constitutes one of the plainest indications for their use, and it has been well insisted upon that the value of sodium bicarbonate is especially striking in the relief it gives to the pain and uneasiness which arise, in many dyspeptics, towards the END of digestion, whatever chemical type the gastric secretion may assume. Some importance must also be given to the property of dissolving mucus possessed by warm solutions of sodium bicarbonate, of great value when dealing with chronic gastric catarrhs and their sequelæ. As to the influence of this salt on the secreting functions of the stomach, the prevailing belief is that it acts as an excitant. Linossier maintains that its action is always excitant, but that it acts in subordination to the following law:—"The sensibility of a stomach to sodium bicarbonate is in inverse proportion to the richness of its secretions in hydrochloric acid." In accordance with this law, we should prescribe it in much smaller doses in cases of *hypochlorhydrie* (defective acidity) than in cases of *hyperchlorhydrie* (excessive acidity), a practice which clinical experience has already made common. But, as we have already pointed out, we must always take into consideration the state of the general health and the coexistence of disease of other organs on which the dyspepsia may depend, if we would explain the success so often observed of the same mineral spring in the treatment of different types of dyspeptics.

Taking Vichy as the type of the simple alkaline springs, we find that Vichy possesses several sources, all of the same chemical composition, and differing only in temperature, and in the proportion of free carbonic acid they contain: the coldest spring has a temperature of 57° F., and the warmest a temperature of 104° F. They contain from 75 to 80 grains of sodium bicarbonate in a litre.

Vichy is a *drinking* rather than a *bathing* station, although the admirably arranged baths and douches afford valuable

accessories to the drinking cure in many of the maladies treated there.

In directing a dyspeptic patient to Vichy, or, indeed, to any other mineral spring, it is very important, first of all, to distinguish between cases of primary and secondary dyspepsias. If the dyspepsia depends on organic disease of the stomach, or on a serious lesion of some other organ, it is rarely advisable to send him to a distant spa to drink mineral waters, unless we are only looking for temporary amelioration of certain symptoms. Inattention to this consideration accounts for the popular opinion we so often hear expressed, and especially with regard to Carlsbad—that treatment there is a case of "Kill or Cure!"

Carlsbad has been, very unjustly, accused of killing patients who have, in fact, succumbed soon after a course of treatment there from malignant disease, either undiagnosed, from special difficulties in the case, or because the patients have insisted on trying Carlsbad as a last resource.

Some of these secondary dyspepsias are greatly benefited by treatment at Vichy, especially those dependent on certain diseases of the liver and bile-ducts; as biliary calculi and gravel, catarrh of the bile-ducts, cholæmia, hepatic congestion due to alcoholic or dietetic excesses, portal hyperæmia (abdominal plethora), and early cirrhosis. Dyspepsias associated with uricæmia, gout, diabetes, and obesity are often greatly benefited by Vichy. Vichy is scarcely to be recommended in those dyspepsias which owe their origin to some original nervous affection; but it is otherwise if the nervous disturbance is secondary to the gastric trouble. In that case, Vichy may be of much service, especially when the patient is suffering from defective secretion (*hypochlorhydrie*). It has been observed with the hyperchlorhydric type that treatment at Vichy may at first aggravate the symptoms, but that ultimately great benefit is experienced.

As to cases in which the dyspepsia depends on defective gastric mobility (dilatation) when the dilatation is connected with hyperacidity of the gastric secretion irritating the duodenal walls, and causing pyloric spasm (according to A. Robin, the most common cause of gastric dilatation), alkaline waters, by neutralising the hyperacidity, and by

promoting the secretion of the neutralising fluids—the bile and pancreatic juices—which protect the duodenum against the irritation of the hyper-acid chyme ; in such cases the alkaline waters of Vichy may render great service, for this form of dilatation is functional and curable. In the rarer cases of atonic dilatation, the Vichy course is less applicable, although some hold (Mathieu) that sodium bicarbonate excites the muscular coat of the stomach. Dilatations depending on pyloric stenosis of structural nature cannot be expected to be benefited by mineral waters. The same remark applies to cases of chronic gastric ulcer and malignant growths.

At Vichy the *warm* springs are those generally used in the treatment of dyspepsias, and especially the *Hôpital* spring. *Vals*, although possessing very important alkaline springs, is not so well suited to the treatment of dyspepsias as Vichy ; it is much less accessible, and it has no *warm* springs. But its waters are very suitable for transportation and home use, as they are rich in sodium bicarbonate and in free carbonic acid.

Neuenahr is easy of access, being only a few miles from Remagen, on the Rhine, and is pleasantly situated in the Ahrthal. It has warm, mildly alkaline springs, containing much free carbonic acid. A litre of the water contains about 9 grains of sodium bicarbonate and 4½ grains of magnesium bicarbonate. These are the only *warm*, simple alkaline springs found in Germany.

Neuenahr may be regarded as a *mild* Vichy, but its springs differ from those of Vichy in containing a notable amount of magnesium bicarbonate. It is especially suitable to the treatment of *atonic* forms of dyspepsia—the hypochlorhydric—particularly when associated with a feeble heart ; the stimulating effect of the large quantity of free carbonic acid proves helpful in such cases. It is not so hot there as at Vichy in midsummer. Dyspepsias associated with glycosuria derive great benefit from treatment there.

Bilin, in Bohemia, near Teplitz, is resorted to by German dyspeptics—cases especially of gastric and intestinal catarrh, and mild forms of hepatic congestion. The spring is a *cold* one, and is rich in sodium bicarbonate (45 grains to the litre) ; it also contains much free carbonic acid. It is largely exported

in bottles. It has no particular attractions for English invalids.

Next in order and usefulness to the *alkaline* springs, and equal, or even superior, to them in the treatment of some forms of dyspepsia, are the *sodium chloride* waters.

The *cold* springs of Homburg and Kissingen, and the *hot* ones of Wiesbaden, are the most popular on the Continent, and in this country we have the "Kissingen" spring at Harrogate, and the "saline" spring at Llandrindod, both of them cold springs. It is especially in the atonic forms of dyspepsia (the hypochlorhydric) that the sodium chloride springs prove beneficial. It has been experimentally established that the prolonged use of sodium chloride waters increases the gastric secretion of hydrochloric acid. This effect is rendered more striking when the springs contain much free carbonic acid, which act also as a stimulant of gastric secretion, as at Kissingen.[1] Kissingen is, therefore, accepted in Germany as the ideal type of this class of waters, and is very largely resorted to by atonic dyspeptics. Cases of gastro-intestinal atony, accompanied by constipation and abdominal plethora, are also suitably treated at Homburg. The Homburg springs resemble closely those of Kissingen, but they are less easily digested by many dyspeptics, probably on account of the iron and earthy salts they contain, as well as the larger quantity of sodium chloride.

The chloride of sodium springs, like those of Kissingen, have the advantage over the simple alkaline springs that they have a decidedly laxative tendency, and this largely increases their usefulness in anæmic dyspeptics with hæmorrhoidal tendencies. The small amount of iron they contain may also act as a blood-restoring agent in such cases. The atonic forms of gouty dyspepsia are treated with advantage at Kissingen. We must not forget that the same class of cases may be profitably directed either to Harrogate or Llandrindod, where they will have the advantage of a far more bracing and tonic climate than they will find in the hot valley in which Kissingen lies.

The hot springs of Wiesbaden are very rich in sodium chloride, but they are not greatly resorted to by dyspeptics;

[1] *See* article by Adolf Bickel, *Berliner klinische Wochenschrift*, January 8, 1906.

They may, however, often be usefully prescribed in cases of chronic gastro-intestinal catarrh, in which cases the hot mineral baths prove a valuable auxiliary.

The weak, warm sodium chloride springs of *Baden-Baden* are not often prescribed for uncomplicated cases of dyspepsia, but they are sometimes found useful in the catarrhal form in feeble, nervous patients. The fine scenery, the very comfortable hotels, and the brightness of the out-of-door life at Baden-Baden are helpful accessories in the treatment of the nervous dyspeptic. The warm common-salt springs of *Monte-Catini* in Italy, between Lucca and Florence, prove useful to the same class of dyspeptics, but the place is too hot in summer to commend it to English patients.

There is a class of mineral waters which combine, in some measure, the properties of the two preceding, and contain in appreciable quantities both sodium bicarbonate and sodium chloride. These waters are found very useful to a certain number of dyspeptics.

Ems, in Germany, belongs to this class, so do Royat and Châtel-Guyon and Saint Nectaire in France. At Ems the springs are warm, and they contain about 30 grains of sodium bicarbonate, and 15 grains of sodium chloride in the litre, as well as a considerable amount of free carbonic acid. They are well adapted to cases of dyspepsia in atonic, gouty subjects who are, at the same time, troubled with chronic bronchial catarrh, and to cases associated with hepatic congestion and chronic diarrhœa. *Royat* is suited to the same class of cases.

Châtel Guyon has warm springs of rather more complex composition, magnesium chloride being regarded as their characteristic ingredient, and the amount of sodium bicarbonate they contain being comparatively small. They are rich in free carbonic acid. Lavage of the stomach and intestinal irrigation are specialities at Châtel-Guyon. The water has a laxative action, and relieves portal congestion. The place is largely resorted to by dyspeptics with atonic gastric dilatation, and those with chronic constipation associated with anæmia, and particularly by cases of chronic appendicitis and mucomembranous entero-colitis. In the latter cases great benefit usually follows the special treatment applied at Châtel-Guyon.

Saint Nectaire, in Auvergne, not far from Mont Dore, belongs to this class of springs. The water contains about 20 grains of sodium chloride and nearly as much sodium bicarbonate in a litre as well as 15 grains of calcium bicarbonate. The cases sent to St. Nectaire include mild, atonic forms of dyspepsia, and especially cases in which albuminuria exists as a consequence of dyspepsia. In these latter, St. Nectaire, according to Professor A. Robin, exerts an especially favourable action.

A *very important* class of mineral springs in the treatment of dyspeptic conditions are those which contain considerable amounts of alkaline sulphates and chlorides, as well as bicarbonate of sodium.

Carlsbad may be taken as the type of this class. The Carlsbad springs are all of the same composition, and differ only in temperature. The hottest of these is the "Sprudel," which has a temperature of 162·5° F. A litre of this water contains about 35 grains of sodium sulphate, 18 grains of sodium bicarbonate, and 15 grains of sodium chloride. These waters have a sedative effect on the stomach, and are most useful in cases of hyperacidity with much gastric irritation. They are of very great service to those dyspeptics who suffer from congestion of the liver and defective biliary excretion, and in all forms of functional hepatic disorder. They favour hepatic and renal elimination, and are therefore useful in gouty cases, and although not always exerting a laxative action, they usually do so when taken in full doses, and when they fail to produce an aperient effect the addition of some Carlsbad salts to the water (a common practice at Carlsbad) renders it sufficiently laxative.

These waters are very useful in cases of dyspepsia associated with habitual constipation, a common condition in the gouty, who resort in great numbers to Carlsbad. It is also a popular resort with those fat dyspeptics who suffer also from glycosuria, and year by year they return and derive, as a rule, much benefit from such visits.

In cases of gastro-intestinal catarrh, with or without diarrhœa, a carefully directed course at Carlsbad rarely fails to be of signal service.

In recent cases of hyperacid dyspepsia with constipation,

in non-nervous persons, the Carlsbad course is clearly indicated, but not so with atonic, nervous dyspeptics; these should not be sent to Carlsbad, they are best treated at Kissingen. Carlsbad, again, is not well suited to very chronic forms of dyspepsia with much general depression and loss of tone, nor is it suitable to cases of chronic dilatation of the stomach, or to cases of pyloric stenosis.

We should not recommend it in dyspepsia dependent on organic disease of the stomach or intestines, although some German physicians recommend it in cases of simple gastric ulcer, and we have certainly seen much improvement in health follow, from the relief of symptoms, in certain cases of very slowly progressing scirrhous pylorus. But, as we have already observed, it is owing to the frequency with which cases of malignant gastro-hepatic and other fatally progressive maladies are unfortunately sent to Carlsbad that it owes its reputation with the public as a "kill or cure" treatment. For the dyspeptic, however, with functional hepatic complications, Carlsbad is especially indicated.

The strict application of dietetic rules prevailing at Carlsbad favours greatly the success of the course in properly selected cases.

Marienbad, but a few miles from Carlsbad, has springs containing the same salts as those of Carlsbad, but in different proportions, and they are *cold* springs.

They are much more active as aperients, being much richer in the *laxative* sodium salts. The strongest spring—the Ferdinand's Brunnen—has 75 grains of sodium sulphate, 30 grains of sodium chloride, and 25 grains of sodium bicarbonate in a litre.

Marienbad has a great reputation in the treatment of obesity, and the dyspeptic states (usually hyperchlorhydric) associated often therewith. In the case of gouty dyspeptics, who suffer from periodic headaches, constipation, and abdominal plethora, Marienbad is indicated. Owing to the presence of iron salts in some of its springs, anæmic dyspeptics with habitual constipation may be benefited by treatment at Marienbad, and this class of patient may also be satisfactorily treated at the adjacent Franzensbad.

Tarasp, in the Lower Engadine, has springs containing the

same constituents as those of Carlsbad and Marienbad, and the same class of dyspeptics as are treated at the two Bohemian spas may be directed to this Swiss resort. It is, however, more particularly suited to the nervous and atonic dyspeptic, with general depression, who is likely to derive benefit from the more bracing situation and more tonic air. The adjacency of Tarasp to St. Moritz in the Upper Engadine renders it easy for the anæmic dyspeptic to seek further restorative treatment—a sort of supplementary cure—at the iron springs of St. Moritz. It is, however, most important not to allow dyspeptics, who suffer from constipation or from sluggish and congested liver, with a tendency to hæmorrhoids, to stay long in the Upper Engadine, as great discomfort often follows such attempts at bracing treatment in these cases.

There is an attractive resort in Savoy—*Brides-les-Bains*—which is well adapted to the treatment of many of the same class of cases as it is customary to send to Carlsbad or Marienbad. It has, indeed, been termed "the French Carlsbad," but the composition of its springs is not very similar. The Brides springs contain no sodium bicarbonate, a very important distinction between them and those of Carlsbad. Its chief constituents are sodium chloride (about 28 grains to the litre), sodium sulphate (about 18 grains), and magnesium sulphate (about 5 grains). It is a more decidedly laxative water than that of Carlsbad, usually acting with certainty although gently. It is of great service in treating the milder forms of dyspepsia of the atonic type when associated with habitual constipation. The picturesque Alpine scenery and sub-alpine climate are useful auxiliaries. It has, like Marienbad, a great reputation for the cure of obesity. It is an exceptionally agreeable resort in the *early part* of the summer, and convenient of access to patients returning from the Riviera and Italy or Algiers, but it is often unpleasantly hot and crowded in July and August.

Sulphur waters are sometimes recommended in dyspeptic cases, and especially in forms of gastralgia, but, as has been suggested by Linossier, it is probably *not* to the presence of sulphur compounds that they owe whatever success follows their use; it is rather to their thermality, or to the aperient action of other constituents in them, and he points out, with some cogency, that in those sulphur spas where gastric cases

are treated, and where there is a choice of springs, it is always that source which contains the least sulphur which is employed or the source without any sulphur, if there happens to be one!

Of the *indifferent thermal springs* little need be said from our present point of view. We may, however, mention *Plombières*, a spring of this class, which is now largely resorted to by certain cases of intestinal dyspepsia, and intestinal irrigation is largely employed there. The treatment of muco-membranous enteritis is specially undertaken there; also cases of chronic diarrhœa and cases of spasmodic constipation are benefited. Its waters are essentially sedative. Some French authorities consider its waters also useful in simple gastralgia and in those dyspepsias which are dependent on nervous excitement.

THE TREATMENT OF TUBERCULOUS PERITONITIS.

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While, during the last generation, the results of a fuller knowledge and more rational methods of treatment in pulmonary tuberculosis have almost sufficed to remove the "spes phthisica" from the realm of paradox, the outlook in other forms of tuberculous disease has undergone a real, if less striking, improvement. How great this improvement has been in the case of tuberculous peritonitis may be judged, from a comparison of the recent statement of Dr. Burney Yeo, that "over 50 per cent. recover," with that of Sir Thomas Watson, who wrote many years ago as follows:—"These are very unpromising forms of disease, and it is seldom that we can do more than mitigate the most distressing of the symptoms, or retard perhaps the march of the disorder . . .; do what we may, in nine cases out of ten, our best efforts will be disappointed."

The wide divergence of opinion, which has existed in the past, in regard to the curability of the disease, may be illustrated by comparing the words of Lawson Tait, who, in the year 1887, wrote that "80 per cent. recover after laparotomy," with those of Fagge, who, in the following year, remarked:—"We have had several instances in which there was reason to believe that recovery took place, and in one case the diagnosis was afterwards proved to be correct by post-mortem examination." Again, in the year 1893, Dr. Frederick Taylor, at a meeting of the British Association, stated that "among tuberculous affections that are classed under medical ailments, tuberculous peritonitis is the most favourable, and most likely to end in practical cure or recovery"; while, in 1894, Professor Dieulafoy gave it as his opinion that "death is almost always a consequence; a cure is, however, possible."

Such divergence of opinion is, however, in all probability, largely due to the variability of the meanings applied to the

terms "cure" and "recovery." It is as difficult, in tuberculosis of the peritoneum, as it is in the corresponding affection of the lungs, to say exactly when an actual cure has been accomplished. In both, the symptoms may abate and the signs of the disease disappear, and, yet, deposits of virulent bacilli remain, which, when the conditions again become favourable to their growth, will form the starting-points of a recrudescence of the affection.

It is mainly for the above reason that statistics, such as are necessary for comparing the results of the various methods of treatment employed at the present day, are so difficult to obtain, and so apt to be fallacious. Owing to the practical impossibility of keeping in touch for a sufficient length of time with many of the patients who have been treated in public institutions, such questions as the frequency of permanent cures, and the relative value of the means used to bring about such cures, are extremely difficult to settle.

Hence it is that, while the criterion in estimating the comparative utility of a certain method of treatment should be its capability of producing a complete and permanent cure, as a matter of practice the standard employed must be rather that of its rapidity and efficiency in bringing about an abatement of symptoms, and a disappearance of gross signs of the disease. Regarded from this standpoint, it is certainly the case, that of recent years considerable advance has been made in the treatment of tuberculous peritonitis; and it is probable that this is largely to be attributed to modern enlightenment in respect to the treatment of tuberculous disease in general, as well as to a recognition of the value of surgical intervention in certain cases of the peritoneal affection.

The question of the association of tuberculous peritonitis with tuberculous disease elsewhere is one of considerable moment, as bearing on the method of treatment to be selected in any given case, and the results as regards permanent cure which may be expected. According to Osler, "In many cases the process is entirely local. In five of 17 cases (30 per cent.), of which I have post-mortem notes, the condition was confined to the peritoneum." As showing how such primary peritoneal infection may occur, the experiments of Wesener and Cornil, and also those of Debroklowsky, are of interest, demonstrating

as they do, that it is possible for the bacilli to pass through the intestinal wall from within, and so to reach the peritoneal surface, without producing any gross lesion of the former. If the frequency of this primary infection of the peritoneum were such as the figures given by Osler, with reference to a comparatively small number of cases would seem to indicate, a very favourable light would doubtless be thrown upon the prognosis, and the results to be expected from treatment; the great majority of writers on the subject are, however, rather of the opinion, expressed by Mr. Watson Cheyne, that "primary tuberculosis of the peritoneum is comparatively rare." The most common seats of the primary lesion are probably the intestines (especially the lower part of the cæcum and ileum), the mesenteric and retro-peritoneal glands, and the genito-urinary system. With reference to the last of these, it is to be noted that the Fallopian tubes in women are a frequent source of infection. According to Fagge, "in the female above puberty, tuberculous peritonitis is almost always accompanied by Fallopian tube disease." It is probable that, in some of these cases, the tube-infection is secondary to that of the peritoneum; and this view is supported by the fact that Jani found tubercle bacilli in the fimbriated end of an otherwise normal tube, removed from the body of a woman who died of pulmonary and intestinal tuberculosis. In this instance, the bacilli were presumably drawn by ciliary action from the peritoneal cavity towards the cœlomic end of the tube. Of 60 post-mortem examinations on cases of tuberculous peritonitis by Dr. Colman, 66 per cent. showed lesions of mesenteric glands, while other parts, affected with more or less frequency, were the vesiculæ seminales, the epididymis and testis, the vertebræ, and the coxo-femoral joints. Of especial interest, as bearing upon the advisability of a recourse to operative measures, is the question of the frequency of chest lesions in tuberculosis of the peritoneum. Of nine autopsies, by Fagge, on persons who succumbed to the disease, seven showed tubercles in the lungs, but in almost all of them the pulmonary affection was so slight that it would not have been capable of recognition during life. Dr. Colman was able to demonstrate an interesting relation between the variety of tuberculous peritonitis and the frequency of chest involvement. Thus, of

nine cases in which the abdominal affection was of the ascitic variety, and almost confined to the parietal peritoneum, all had advanced caseation of the lymph glands of the thorax and pulmonary tuberculosis, while only two had tuberculosis of the intestines and mesenteric glands. Hence, in at any rate seven of these, the primary lesion was presumably thoracic. On the other hand, he found that in the caseating and ulcerous variety of the disease, tubercle of the intestines and mesenteric glands was present with much greater frequency, while chest lesions were often entirely absent. Be this as it may, it is certainly the case that only in comparatively rare instances is the chest involvement of so pronounced a character as to form an absolute contra-indication to treatment by laparotomy. A pleural effusion, usually one-sided, is a frequent accompaniment of tuberculous peritonitis, and, although of little moment from the point of view of treatment, may be of considerable diagnostic importance. It is probable that, both in this case and in that of involvement of the pericardial sac, infection takes place by direct extension through the diaphragm.

In any given case of tuberculous peritonitis, the method of treatment to be adopted depends to a very large extent upon the form in which the disease presents itself; a consideration, therefore, of the several varieties assumed by the affection must form a part of any discussion of the means to be employed in its arrest. Speaking broadly, three main types may be recognised, namely, the ascitic, the fibrous, and the caseous or ulcerous. In the first of these, the "ascitic," the most prominent feature, as its name implies, is the presence of fluid in the abdominal cavity. In a certain proportion of these cases, the onset of the disease is fairly acute, and it may be so abrupt as to suggest a diagnosis of acute enteritis or internal strangulation; in these instances the fluid is commonly hæmorrhagic, or purulent. More often the onset and course are sub-acute, or chronic, and while instances occur in which there is no indication of the disease beyond the gradual accumulation of fluid, as a rule, this is accompanied by such symptoms as irregular pains, tenderness, flatulence, constipation or diarrhœa, and hectic fever. In the ascitic form, the fluid may be entirely free in the abdominal cavity, or, owing to a certain amount of adhesion of the coils of intestine to one another and to the

abdominal parietes, the exudation may be to a greater or less extent encysted; and it is this variety which is so liable to be, and has so frequently been, mistaken for ovarian tumour. In cases of the ascitic type the peritoneal surface of the intestines, as well as the parietal peritoneum, is usually thickly studded with small greyish-white miliary tubercles of about the size of a pin's head, the so-called "sago-grain" granulations; in some cases, however, these may be almost confined either to the visceral or the parietal layer.

The second or "fibrous" form may, as pointed out by Holt, be compared to Fibroid Pulmonary Tuberculosis. It is the rarest, but on the whole a favourable variety. Sometimes a sequel to the ascitic form, it is more frequently typically fibrous from the first. The characteristic feature is the great development of fibrous tissue causing extensive matting of the intestinal coils, together, in many cases, with distortion and great tendency to obstruction of their channel. Cases of this kind are, as a rule, very chronic, and marked remissions are common. Secondary infection may occur by passage of the bacillus coli through the intestinal wall, without necessarily any gross lesion of the latter, and in consequence an acute purulent peritonitis may supervene. Prominent among the symptoms are colicky pains, and very obstinate constipation, which may result in acute obstruction necessitating abdominal section for its relief. On post-mortem examination, in some instances, the coils of intestine are matted together to such an extent that they form a ball-like mass firmly fixed to the posterior abdominal wall, while the great omentum is represented by a sausage-shaped body, lying transversly across the upper part of the abdominal cavity. In cases of this sort a new growth may be closely simulated.

The third or "caseous" variety is characterised, as is the fibrous, by considerable matting of the intestinal coils, but, in addition, presents localised masses of caseous material between, and about the coils of gut; these breaking-down masses consist of deposits of tuberculous material, both in the mesenteric and retroperitoneal glands, and in the walls of the intestines themselves and the fibrous tissue uniting them. There is, in addition, a great tendency to ulceration, which may lead to perforation of the gut wall or abdominal parietes, with the development of

fistulæ, either external, or from one coil to another (fistula bimucosa). This is the most serious of the three forms, and is the "variety which we see so typically in wasted children with hectic, vomiting, and diarrhœa." (Jacobson.)

It is easy to recognise and distinguish typical cases of any of the above varieties, but it is to be noted that intermediate forms are extremely common; and this is only what would be expected, seeing that "the different varieties in clinical manifestation, are due mainly to different degrees and extent of the inflammatory process, and to the proportions in which the various inflammatory products are formed." (Allchin.) Of the three, the ascitic form is, perhaps, the most definite, but in any given case it may, as remarked above, be replaced later by the fibrous form, and this may in turn be followed by the caseous variety.

It is now proposed, first of all to give some account of the measures, which have been in the past, and are at the present day, employed in the treatment of tuberculous peritonitis on medical lines; in the next place to discuss the surgical procedures which may be adopted; and, lastly, to attempt to indicate the method to which recourse should be had in dealing with individual cases of each of the three varieties.

In the year 1881, Dr. Gee pointed out that many cases of the disease recover under medical treatment; and that this is undoubtedly the case has been frequently proved; such recoveries are indeed, at the present time, almost of daily occurrence. A large number of drugs have been employed at various times, and while many of them are certainly valueless, there are a few that appear to have a very decided influence upon the condition. Of these, mercury, in the form of local inunctions to the abdomen, has perhaps the widest reputation. In the year 1888, Fagge wrote: "It appears probable that in children tuberculous peritonitis is capable, in the majority of cases, of being cured by the local application of Linimentum Hydrargyri, ... we have more than once seen the greater part of the fluid removed within a few days under such treatment, and the patient also improved in health, and gained in strength." The method adopted at the present day is as follows:—The patient is kept absolutely at rest, on his back, and should spend the whole of the day, and, if practicable, in summer at any rate, the

night, in the open air. The mercury may be applied in the form of a 2½ per cent. to 5 per cent. oleate, as the Unguentum Hydrargyri Co: or as the Linimentum Hydrargyri. About half a drachm is rubbed into the skin of the abdomen once a day, while on one or more days in the week, according to the amount of local irritation and constitutional symptoms produced, the inunction is suspended. At the same time cod-liver-oil or other tonics, calculated to place the patient in as favourable a position as possible for combating the disease, are prescribed; a like result being aimed at by the administration of as full and nourishing a diet as can be digested.

Another drug that has been used with much apparent success is iodine; the idea of the latter as an antitoxin to tubercle is an old one. Sir Thomas Watson wrote: "It has been thought that friction upon the abdomen with ointments containing iodine has done good, so it will be well to make trial of such." Dr. Burney Yeo records a case of tuberculous peritonitis in a boy, 12 years of age, with much ascites, which yielded to the following treatment:—The abdomen was painted with tincture of iodine, at first daily, and later on alternate days, and, over the area so treated, olive oil was smeared to prevent evaporation; at the same time half a grain of iodoform, in two drachms of Ol. Morrhuæ, was given thrice daily by the mouth. Three cases, treated later on similar lines, also gave very satisfactory results. Again, in the year 1899, two Italian physicians recorded a case in which cure followed, in 10 weeks, injection of the following solution of iodine:—Iodine 10 grains, potassium iodide 30 grains, and water 1½ ozs. At first, about 10 minims of this fluid was injected daily in the genital region for ten days, and after that the same amount on alternate days. Some fluid was withdrawn from the abdominal cavity after 14 days of this treatment, and gave no tubercle cultures, nor were guinea-pigs, which were inoculated with it, affected. Another method of the administration of iodine is that of inunctions of equal parts of the unguentum iodoformi and Ol. Morrhuæ. Whether iodine is given as such, or as iodoform, the mode of action is probably the same. It is well known that when potassium iodide is given by the mouth, iodine compounds can in a very short time be detected in the saliva and urine; and the same is true

after the subcutaneous injection of iodine solutions and the inunction of iodoform. Dr. Still found that iodoform ointment is excreted, and easily recognisable as iodine, or salts of iodine, in the urine, and that the rate of excretion is very rapid, half a drachm being eliminated in four hours. It seems very probable that the pathological secretions, such as those into the serous cavities, partake in this elimination of iodine compounds from the blood, and as these serous effusions do not pass out from the body, they must, in course of time, become pretty richly charged; at any rate, sufficiently so to act as anti-bacterial agents to the tubercle bacilli. It appears not unlikely that this is also the rationale of "cures" by means of mercurial inunctions.

The treatment of tuberculous diseases in general by means of creosote was first recommended by Dr. Revillet, of Cannes, but was used by him only for cases of phthisis. In January 1897, Professor Thoma, writing in the *Lancet*, advocated the employment of creosote in pleuro-peritoneal tuberculosis in children. It may be given by the mouth as a pill, or in milk, or, perhaps better, as an enema with cod-liver oil; that the latter is very well absorbed from the rectum was shown by Professor Schiff, and further established by Dr. Loppino, who found this method of administration very useful in carrying out the "over-feeding" of the Weir-Mitchell treatment. An enema suitable for an adult would consist of 5 minims of creosote and 4 ozs. of Ol. Morrhuæ, given once a day, and retained, for as long as possible. The dose of creosote is increased in eight or ten days to 15 minims, and, after three weeks, the enemata are suspended for a week, and re-commenced at the end of that time. In some cases, diarrhœa is set up, but it is usually possible to continue the treatment after an intermission of a few days.

Among other drugs that have been employed are ichthyol and naphthol. The former is objectionable on account of its bad smell. With regard to the use of naphthol, it may be noted that Dr. Spillman obtained a "complete cure" in a boy, 13 years of age, by the withdrawal of one pint of fluid from the peritoneal cavity, and the subsequent injection of 3 drachms of a solution of naphthol camphor, consisting of three parts of camphor to one of B-naphthol. Lastly, guaiacol has

been employed, and C. Leroux (*Annales de Médecine et de Chir. Infantiles*, September 15, 1903) describes the case of a girl, aged 11 years, whose abdomen was hard and distended, with masses of tuberculous material to be felt, who recovered completely, the abdomen becoming perfectly supple and normal, after the administration of guaiacol combined with a prolonged stay at the seaside.

It is undoubtedly extremely difficult to determine the value of the various drugs which have been employed in dealing with this condition, and, at the present day, there is certainly a tendency to scepticism with regard to the usefulness of the so-called "specifics," and most authorities place reliance rather on general hygienic measures, and the use of such drugs only as tend to improve, as much as possible, the general health. G. A. Sutherland (*Arch. Pediatrics*, February, 1903) says that "perhaps in no form of tuberculosis does nature make greater or more successful efforts to cope with the disease." And, further, Osler suggests that, in many cases, it is highly probable that spontaneous cure occurs, just as it does in pulmonary tuberculosis, by the lesions undergoing retrograde fibroid and sclerotic changes, when the patient, by means of rest, good feeding, and fresh air, is put in the best possible position for combating the disease. Leroux emphasises the value of prolonged residence at the seaside, and says that, to obtain the best results, the seaside treatment must be begun early, and continued without interruption until recovery is complete.

While there can be little doubt that such hygienic measures form the most important part of the "medical" treatment of tuberculous peritonitis, there would appear to be fairly good grounds for supposing that certain of the "specific" remedies referred to above are not without their value, particularly the mercurial and iodoform inunctions. The following is an instance of a complete recovery under the use of mercury :—M. B., a girl, aged 14, had suffered for three months from aching pain in the abdomen about the region of the umbilicus. During that time, a gradual enlargement of the abdomen had been noticed, and there had been diarrhœa with occasional vomiting for the last fortnight before admission to St. Thomas's Hospital. On admission, the abdomen contained free fluid in fairly large quantity, and the circumference at the umbilicus was

30½ inches; no masses were felt. The treatment consisted of rest in bed, together with the inunction daily of one drachm of the unguentum hydrargyri to the surface of the abdomen, and the administration by mouth of Ol. Morrhuæ and extract of malt. The girth of the abdomen gradually decreased, until, after two months in hospital, it measured 27 inches, when no signs of fluid, or other abnormality were to be detected, and the patient was discharged apparently quite recovered. It may be added that, on admission, there were indications of fluid in both pleural sacs, while, on discharge, these had disappeared, leaving only slight impairment of resonance at the bases of the lungs behind. Another patient, H. G., six years of age, had suffered for nine months from abdominal pain and vomiting, with, at times, obstinate constipation. The disease was, in this case, of the fibrous variety, there being no free fluid, but several firm roll-like masses. At first, cod-liver oil and extract of malt were administered, but later, as little improvement was noticed, recourse was had to syrup: ferri phosphatis and guaiacol, with the result that a complete cure took place, with a decrease of 1½ inches in the girth of the abdomen.

It may be here remarked that the efficiency of the drugs employed must necessarily be determined very largely by the conditions existing in any given case. "In advanced chronic cases, and especially in patients of riper years, the conditions essential to the curative action of a remedial agent are probably absent. In such cases, the facility of the diffusion of an anti-toxic, or anti-bacterial, agent into the affected tissues may be very much less than in a patient of tender years, and in attacks of recent origin." (Burney Yeo.) Variations in the powers of absorption, and in the resistance and reaction of tissues, must entail variations in the activities of the remedies employed, but the latter are none the less remedies because their "curative efficiency needs the presence of certain favourable conditions."

If the methods employed by the physician in dealing with tuberculous peritonitis have been, in the past somewhat empirical, the same must be said of those to which the surgeon has had recourse. In the year 1862, Spencer Wells, doing a laparotomy on a supposed case of ovarian tumour, found that the condition was in reality one of tuberculous peritonitis; the fluid was evacuated, and, quite contrary to expectation, did not

subsequently return, a perfect cure resulting. Since that date, cure, and not relief only, has, in many instances, followed evacuation of the fluid; and, in a few cases, in which the abdomen has been subsequently opened for some other condition, the peritoneum has been found absolutely normal; and this notwithstanding the fact that at the first operation numerous tubercles were present, the genuineness of which was established, both microscopically and by inoculation experiments.

Some reference must be made in the first place to the question of the value of simple aspiration, or paracentesis, as a remedial measure in this disease. Almost all the authorities regard it as quite insufficient, and would restrict its use only to the relief of the symptoms resulting from great abdominal distension, in those cases in which, with much ascites, there is some absolute contra-indication to laparotomy, such as pronounced pulmonary tuberculosis. As a rule, no doubt, the fluid does rapidly re-accumulate after removal by aspiration, but there is reason to believe that this is not always the case, and that a permanent cure may be effected in certain instances. Dr. Burney Yeo points out that, "in cases with much ascitic fluid in children, repeated aspiration, or tapping, has been attended with successful results." A woman, aged 41, was admitted to St. Thomas's Hospital, giving a history of abdominal pain and dyspepsia, together with gradual abdominal distension during a period of 6 weeks. On admission, the girth of the abdomen at the umbilicus was $35\frac{1}{4}$ inches, and there were signs of a large quantity of free fluid and one tumour mass in the epigastric region. There was fairly well-marked lung involvement, and it was decided not to have recourse to laparotomy; the treatment at first consisted in the administration of cod-liver oil and other tonics, but later, as the fluid showed a tendency to increase in amount, the abdomen was aspirated and $14\frac{1}{2}$ pints of effusion drawn off. After this, the patient was only under observation for a few weeks, but during that time no re-accumulation took place, and there was marked improvement in the general health and strength. An interesting case was that of a woman, aged 34, who gave a history of occasional slight abdominal pain and some constipation, together with marked swelling of the

abdomen of 4 years' duration. Examination showed that the amount of fluid was very large, and there were no masses to be felt. As there was some respiratory embarrassment, the abdomen was aspirated, and about 1½ pints of fluid drawn off; the flow then ceased, although it was evident that a large quantity of effusion still remained. Not only, however, did no re-accumulation take place, but the fluid which still remained after the paracentesis had been performed, and which was, in fact, by far the larger part of that originally in the abdomen, was at the end of a week completely absorbed. A fortnight later, no return of fluid had taken place, and the patient was discharged in good health, with an apparently perfectly normal abdomen. It has frequently been noted, in regard to pleural effusions of tuberculous origin, that the drawing off of a comparatively small portion of the fluid present has resulted in absorption of the remainder, and a satisfactory termination of the disease. Whatever may be the cause of the resolution in these instances, it seems reasonable to suppose that the case of tuberculous peritonitis just quoted belongs to the same category.

(*To be continued.*)

SUPPRESSED GOUT.[1]

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With gout in its acute form I am not now concerned, nor is it within the compass of the space at my command to enter upon a discussion of the various theories which flood the pages of our current literature concerning its relationship to uric acid. At the outset, however, we must come to a clear understanding as to what precisely we mean by a gouty state. I, for one, am not disposed to regard uric acid as the end-all and be-all of the disease, but rather as one of the phenomena symptomatic of certain subtle chemical changes taking place within the tissues of the organism; changes which are doubtless influenced by unsuitable food, but which also owe their development, in no small measure, to inherited tendencies and to defective tissue stability.

Since Garrod first discovered that uric acid was present in the blood of patients during an attack of gout, the theory that the disease is directly due to its presence has been widely accepted. There is no evidence to prove that this is so; indeed, experiment goes to show that, when uric acid is in solution in the blood, it exerts no harmful influence, though, when precipitated in the form of biurate of sodium, it may, by its mechanical effect, cause damage in the tissues. The visceral disturbances which occur in irregular gout have not yet been traced to uratic precipitation, though such a theory has been propounded, and a toxæmic poisoning of some sort is not an unlikely alternative hypothesis. Though uric acid itself is non-poisonous, it does not follow that the conditions upon which it depends for its excessive production may not coincidently facilitate the elaboration of toxins capable of exciting changes such as would account for much of the symptomatology.

[1] Read before the Norwood Division of the South-Eastern Branch of the British Medical Association.

According to Walker Hall, uric acid is a necessary stage in nuclein metabolism, but its presence in excess is merely a symptom of conditions which hinder its solubility, and is not an evidence of its causative relationship to the diseases with which it is associated.

Some of the teaching of the present day, such as that of which Haig is a leading apostle, strives to persuade us that this uric acid comes exclusively from proteid foods, and that, if these are carefully eliminated from the daily bill of fare, no person need ever be troubled with gouty illnesses. Hare, on the other hand, endeavours to convince us that carbonaceous excess in the blood, a condition which he calls "hyperpyræmia," is more harmful and more likely to be productive of gouty manifestations than any amount of nitrogenous accumulation. Obviously both theories cannot be right, and most of us will, I think, be agreed that, though diet plays an important rôle in ætiology, it is in all probability a contributive cause only. I can recall the case of a lady who reached 76 years of age, whose income never exceeded £60 a year, who lived, consequently, in the most frugal and abstemious way, and yet who not only suffered repeatedly from mild articular gout, but who was never long free from one or other of the accessory ailments which persistently mar the comfort of those who have sprung, as she had, from an ancestry in which gout has largely figured. In cases such as this, the tissues appear to have inherited some depravity of function which makes complete metabolism well nigh impossible, no matter how sparing, or how carefully selected, the diet may be. We are, further, all conversant with the effect, upon metabolic activity, of anxiety, mental shock, or undue excitement. Some of us can recall the disturbed digestion and urate-laden urine which were the sequel to each succeeding professional examination; and, to the present day, many men, at the prospect of making an after-dinner speech, suffer such visceral inhibition that not only is appetite destroyed, but some time is required subsequently to restore digestion to its normal condition. In the case of a friend of my own, who suffered life-long misery from acute gout, the result of a post-prandial oration was almost inevitably an attack of his enemy. Too much dinner! says our dietetic enthusiast, but it was not so, because the penalty, in this case,

was only inflicted when the meal was the preamble to a toast set against his name.

To my mind, the most acceptable view of the nature of gout is that expressed by Luff, who regards it as "a disease which is due to faulty metabolism, probably both intestinal and hepatic, as the result of which certain poisons are produced, and lead to an auto-intoxication which is an early factor in the development of the gouty condition." This auto-intoxication may, or may not, be followed by a deposition of sodium biurate in certain of the joints and tissues, but the fact with which we are specially concerned is that, in the early stages of the gouty process, metabolic changes occur and give rise to a species of toxæmia.

If this theory is considered carefully, it will become apparent how well it fits into a reasonable explanation of the various phenomena of the gouty state. It is common knowledge that the intestinal canal contains large quantities of bacteria which, in normal circumstances, have no injurious effect upon the organism; but a slight change in the quality of the intestinal secretions may readily alter the character of the toxins which these bacteria produce in such a way that metabolism becomes disturbed, and more or less severe auto-intoxication, with an accompanying formation of uric acid in excess, ensues. We are all aware that, not only in true sthenic gout, but in all its aberrant forms as well, there is one invariable symptom, viz.:—digestive disturbance. This is such an unfailing concomitant that most of us would hesitate to regard an illness as gouty, unless there were evidences of gastric upset, together with the accompaniment of another equally important symptom, increased vascular tension.

In an interesting paper contributed by Dr. Wm. Russell of Edinburgh to a recent issue of the *British Medical Journal*, it is pointed out that during active digestion there is an influx of blood to the splanchnic basin, with a corresponding reduction in the volume of blood outside this area. The balance is maintained by a general contraction of the systemic arterial circulation, induced by a reflex act transmitted from the abdomen through the vaso-motor centre in the medulla. This is to be regarded as "a physiological hypertonic contraction,

which in the average person is accompanied by a rise of blood pressure." Such hypertonus is likely to be exaggerated by high feeding and alcoholic drinks, because the normal vascular reflex is thereby unduly accentuated, and also because the passage into the circulation of the products of rich, or excessive food, and of substances derived from the alcoholic liquor consumed, produces direct irritation and contraction of the vessel-walls. Dr. Russell believes this recurring arterial contraction to be an efficient cause of subsequent arterio-sclerosis, and he further asserts that vessels whose walls have become sclerosed are particularly sensitive and specially liable to hypertonic contraction.

In passing, reference may be made to the difficulties most of us experience in estimating vascular tension, and the following points may be recalled as helpful to a true conclusion. When tension is increased, the vessel-walls being contracted, the pulse is always small and hard or even wiry; the beats pass slowly under the finger and the vessel cannot easily be completely emptied between them. In the early stages, when the cardiac contractions are still powerful enough to overcome the peripheral resistance, the pulse-rate follows Marey's law, and is in inverse ratio to the degree of tension, but when the cardiac force diminishes, it becomes *pari passu* accelerated. With a considerable degree of tension, it will be found that, on applying two fingers over the radial artery at a distance of about an inch from one another, though deep pressure by the upper finger may succeed in closing the lumen of the vessel, the pulsations can still be felt below the lower finger. Yet another test consists in contrasting the pulse-rate in the upright and recumbent positions. Normally the heart records six or eight beats fewer when the patient is lying down than when he is erect, but when arterial tension is high, this ratio is abolished, or may be even reversed. In confirmation of these tests, information should be sought from the sounds of the heart, the second of which over the aortic cartilage will always be found accentuated in proportion to the degree of plus tension present.

In our consideration of the gouty state, let us then adopt, as a working hypothesis, that the exciting cause is a toxæmia, which probably originates in the upper part of the gastro-

intestinal tract, and let us regard the following characteristics as foundational symptoms:—1st, gastric disturbance; 2nd, a history of dietetic habits of excess, or irregularity, on the part of the patient, or a record of gouty antecedents in his family; and 3rd, a more or less pronounced and permanent degree of plus tension in the arteries.

The gouty patient may belong to either sex, but is more frequently a man than a woman. He is first driven to the doctor by broken sleep; disturbing dreams; loss of appetite; frontal headache, which is usually worst in the morning, and is often associated with vertigo; epigastric uneasiness after meals with an accompaniment of flatulent distension, heartburn, and sometimes pyrosis; disturbance of the bowels, usually in the direction of constipation; and scanty urine, which is more or less constantly loaded with lithates. He probably complains that his usual aptitude for business is at fault, that unimportant details give him infinite worry, and that it is only at the expense of unwonted effort that he gets through the duties of each day. If the testimony of his wife, or a member of his family, is forthcoming, we discover further that he is abnormally irritable, shuns the society of his fellowmen, and is constantly enveloped in an atmosphere of mental gloom. He is fully persuaded that his domestic circumstances are hopelessly out of joint, that his own health is irretrievably undermined, that his business is going all wrong, and that the country generally is on the straight road to perdition. When the disorder has reached a more advanced stage, the patient complains of tenderness to touch at the pit of the stomach; of irritation in his throat which causes hawking, followed sometimes by retching and vomiting, especially in the morning; of palpitation or occasional faintness; and frequently of hæmorrhoids. On physical examination, the cardinal signs of dyspepsia and excessive tension are at once evident; with, in addition, in the more advanced stages, tender and smooth enlargement of the liver; irregular action of the heart, with slight increase in its transverse diameter; and more or less congestion of the fauces. The urine is deeply coloured, of high specific gravity, abnormally acid, full of urates, and may contain a trace of albumen.

Perhaps the simplest way to recall the most common type

of the disorder is to relate shortly the outlines of two recent cases :—

1. A man of 54 years of age, several of whose paternal ancestors had suffered from acute gout, but whose family history was otherwise good, came complaining of headache, vertigo, lassitude, loss of appetite, shortness of breath on exertion, palpitation, præcordial uneasiness, and mental depression. He had not suffered from any serious illness, and, up to 8 or 10 years ago, had enjoyed unbroken health. Since that time he had frequently been afflicted with what he called "biliousness," but the palpitation, discomfort in his chest, and breathlessness were events of recent development. He was stoutly built, and admitted that he had put on flesh within recent years—a circumstance which he attributed to the demands of his business making it impossible for him to get the amount of active exercise to which in earlier life he had been accustomed. His habits were abstemious, but business and domestic anxieties had recently entered largely into his lot. On examination his tongue was coated; his pulse, which was small and hard, numbered 88, both in the recumbent and in the erect positions; his liver could be felt below the costal arch, and was somewhat tender to touch; his heart was regular in rhythm, but the apex beat was forcible and in the nipple-line, the first sound being muffled at the apex, and the second loudly accentuated over the aortic cartilage. There was no murmur at either of the cardiac orifices, but limited dulness could be elicited on percussion over the manubrium sterni, and the arteries were thickened and tortuous. The specific gravity of the water was 1028; it contained an excess of bile and a thick deposit of urates, but neither albumen nor sugar. The headache and vertigo were most marked in the morning, and there was complete loss of appetite for breakfast, with only a very moderate desire for food at other times. Flatulence was a source of constant trouble, and sour eructations were of frequent occurrence. He had suffered from "bleeding piles" for some years. The organs otherwise were healthy.

2. A lady of 58 years of age came with a story very similar to the foregoing, but with the following additional symptoms: frequency of micturition; marked dyspnœa;

attacks of anginoid pain, which recurred at frequent intervals, and, when severe, made her feel that she was about to die; and a distinct icteric tint of skin and conjunctivæ. In this case the urine contained phosphates, two parts per thousand of albumen, and its density was only 1004. The pulse was rapid, and so irregular that its rate could with difficulty be estimated, and, on examination, the heart presented all the usual features of moderate dilatation. The liver was distinctly enlarged and tender to touch, and there was slight œdema of the ankles.

It will at once be recognised that these cases are illustrative of different stages in the progression of a pathological condition which we see constantly. Neither patient had ever suffered from true gout, nor indulged in habits likely to produce it. Both had gouty antecedents, were over the summit of life, and had gone through somewhat more than the average of work and worry. Beginning with gastric disturbance, they had gradually travelled through vascular tension to arterial degeneration; thence, through threatened cardiac failure, to the brink of angina pectoris and Bright's disease. Though neither of them would believe the malady to be gouty, nothing was wanting to complete the picture except the classical great-toe-inflammation.

But the vascular system, though the principal, is by no means the only outlet of the gouty poison. In the nervous system, it is capable of exciting migraine, neuralgia, or neuritis; in the respiratory system, laryngitis, bronchitis, or asthma; in the genito-urinary system, urethritis, gravel, renal calculus, or interstitial nephritis; in the skin, eczema, herpes, or urticaria; and in the eye, iritis, conjunctivitis, or granular lids. It may also give rise to cirrhosis of the liver, pancreas, and spleen, and to that intractable form of bowel disorder which is known as mucous colitis. In each and all of these conditions gastric disturbance and arterial changes are essential factors.

There is yet one other disease which I desire to mention as being sometimes, not impossibly, a direct consequence of irregular gout. I refer to pancreatitis. We have very little accurate knowledge of pancreatic disease, and, unhappily, what information we possess mostly comes from the revelations of the post-mortem room, but the work of Opie, Mayo Robson, Moynihan and others is directing attention to what has

hitherto been an almost unknown land, and promises to bring the disorders of the deeply-seated and important pancreas within the scope of practical management. The large majority of cases of acute pancreatitis hitherto recorded have occurred in association with the presence of gall-stones, so situated as completely to obstruct the flow of bile into the duodenum. But it is recognised that an ordinary catarrh may cause such swelling of the duodenal mucous membrane as will effectually block the orifice of the hepatic and pancreatic ducts, and it is conceivable that, without the presence of any stone, pancreatitis of the most dangerous type may be thus induced. The following case not only supports such a theory, but further suggests that behind the catarrh suppressed gout may be the *causa causans*.

A man of vigorous health, aged 49, who had passed an active life, free from disease, except for a mild attack of enteric fever twelve years previously, was suddenly seized with pain in the epigastric region. Previous to the onset of this illness he had, during three years, suffered, on three or four occasions, from mild attacks of what was regarded as gastritis. After the last and worst of these attacks, there was a suspicion of jaundice, but it was slight and evanescent, and in every instance the illness lasted only for a day or two, and recovery was apparently complete. His digestion, however, became fickle, and he suffered from constipation, fugitive erythema of his face, headaches, and irritability, to all of which he had previously been a stranger. His father was a gouty man who died of apoplexy, and one brother had suffered for years from acute gout in severe and frequently recurring attacks. The pain which ushered in the present illness was constant, but with severe exacerbations, and was followed, after two days, by obstructive jaundice, which rapidly became extreme. He had no vomiting, but experienced a constant sense of nausea. The liver became enlarged and was tender to touch. The stools were fatty and clay-coloured, and the urine contained much bile but no albumen. After ten days he had a rigor with rapid rise of temperature, and, from that point in his illness, he developed all the usual evidences of septicæmia. The symptoms pointed to the presence of a stone in the common duct with a consequent suppurative

cholangitis, and the condition became so urgent that an operation was imperatively demanded. When the abdomen was opened, no calculus was found, but the pancreas was swollen, and the bile was pale and almost purulent. The gall-bladder was drained, and he made an uninterrupted recovery. Since the date of his operation, two years ago, this gentleman has remained well, and has been continuously engaged in his ordinary business affairs. May this case not fairly be regarded as attributable to gout which had failed to manifest itself through any of the more usual channels? The history of the illness and the family record both point to such an explanation as probably correct. Does it not also raise the question whether many of the cases which we so frequently ascribe to gall stones may not in reality be examples of pancreatitis ensuing upon duodenal catarrh?

The question of treatment, as applied to suppressed gout, is so extensive that it can only be touched upon in one or two of its more important relationships, and especially as these are concerned with prevention. In no other disease can so much be done to ward off the penalties of an hereditary taint as in gout. It may prove impossible to escape entirely from the consequences of dietetic unrighteousness in our forefathers, but by reasonable care, as regards the "intake," the possessor of gouty tendencies may do much to minimise the risks to which his inheritance exposes him. By the same methods of common prudence, also, the danger of acquiring the disease *de novo* may in a great measure be obviated. A wise physician once remarked that a healthy, active man might tax his digestive capacity, within reasonable limits, up to the age of forty without much risk of serious consequences; but that every year thereafter he would require to exercise increasing care, if he desired to retain his vigour and carry it on unimpaired into the later decades of his life. As a general proposition this cannot be gainsaid, but the statement possesses special truth in its bearing upon gouty conditions, because it is mostly on the wrong side of forty that mankind makes acquaintance with them. As regards diet, volumes have been written on what to eat, and what not to eat; on what to drink, and what not to drink; on when and how often to do one or both, and so on. Some sense and much nonsense have been set forth in print on

this much vexed question. My own experience leads me to think that meat is best taken sparingly, but I am not convinced that there is much to choose between one variety of butcher's meat and another. If it is indulged in once a day only, and in moderate amount, and if it is tender, and therefore capable of thorough mastication, any form of meat is wholesome. Mutton may be better than beef, but only because the fibre of the meat being less close, the gastric juices reach it more readily, and deal with it more efficiently. Fish, chicken, and game are probably more digestible than red meats. For obvious reasons, animal food must be specially restricted in those cases in which the kidneys are performing their eliminating functions imperfectly.

As regards vegetables, rhubarb and tomatoes contain oxalates in considerable amount and are best avoided, but of the others, all may be taken, if thoroughly cooked. Green vegetables are, on the whole, better than underground roots, and may be eaten with greater freedom. Some gouty subjects —more especially those who suffer from hyperchlorhydria— digest starchy articles of diet badly, and for them the carbohydrate forms of food should be carefully selected and their amount regulated. I know of no reason why sugar should be forbidden, as is so much the present custom, except in cases where there is glycosuria. When there are good reasons for withholding it, saccharin forms a suitable substitute. Cured and salted foods, and all such accessories as spices, rich sauces, pickles, and the like, are contra-indicated. I am in full agreement with Goodhart, who says:—"Although I do not think there can be the least doubt that a due proportion of meat in the diet is the most appropriate one for the great majority of mankind, I am equally convinced that the trimmings, in the way of sauces and the many different things that are put into the stomach at each separate meal, are the details to which one may take exception."

Fruit, if ripe, or cooked, is unobjectionable.

There are numerous observations which point to salt as an indirect cause of many of the morbid conditions associated with faulty metabolism. It is a necessary and wholesome addition to our daily food, but it should be taken in limited quantity by the gouty.

If these general principles are kept in view, the reasonable dietary for every gouty man, is that which embraces the greatest simplicity, and with which experience tells him he can deal most comfortably. In all conditions, whether of health or disease, the adage is true that "one man's meat is another man's poison," and on that theory we should proceed always, so that our practice becomes one of treating the individual and not the disease.

Of stimulants, it may be said that for the goutily disposed person, the less alcohol in any form he imbibes the better. But complete abstinence is a counsel of perfection which makes life very dull for many of us. If partaken of reasonably, and with meals only, I do not believe that a well-matured light wine, or beer of the Pilsener quality, or a freely diluted spirit, does any harm. I have been unable to persuade myself that whisky is the only form in which alcohol can be safely taken. The heavier wines and malt liquors should be avoided, but a light moselle or hock, especially if diluted in one of the natural table waters, seldom disagrees, and either is, to many palates, preferable to the everlasting whisky, which the public has come to believe in—erroneously I am sure—as the only alcoholic beverage which the gouty may venture on with impunity. Tea is often more deadly than alcohol and should never be taken more than once a day. The best beverage for the morning meal is café-au-lait, or cocoa infused from the nibs. Diluents should be taken freely, and a bottle of Vichy or Contrexéville water,—or an equivalent amount of simple drinking water—is not too large a daily allowance for most men. Exercise is essential, and, in one form or other, must be provided for regularly. Excessive work, irregularity of meals, persistent worry, insufficiency of sleep, and unreasonable ambition are, it is needless to say, rocks in the stream of life which every wise man will strive to steer clear of, but unfortunately the need for "cutting our cloth to our measure" is often forgotten, and we are all apt to acknowledge our limitations only when they are brought home to us by the bitter lessons of experience.

Constipation is so constant an accompaniment of goutiness that special reference may be made to its management as a prophylactic measure. There is no better way of counter-

acting this fault than the use of Carlsbad salts, and one of the best methods of administration is to give a suitable dose in hot water before going to bed, as often as circumstances demand its assistance. Taken at this time, it promotes salivary and gastric secretion, stems the nightly acid tide, and is effective as an evacuant in the morning. For most patients an occasional pill, containing one grain of calomel and four of rhubarb, is attended with the happiest results, and, for many, it is not a bad plan to indulge in such a bolus once in every eight or ten days.

So far as curative treatment is concerned, I dare not trespass further by entering even upon the threshold of its discussion, though it is a subject of the greatest interest. I shall only venture to say that all the various solvents for uric acid, which are so highly praised, have seemed to me to be equally uncertain. The old-fashioned salts of potash have an undoubted value; so also have colchicum, iodide of potassium, chloride of ammonium, nux vomica, and the simple bitters. Each of these drugs must be chosen according to individual requirements, always bearing in mind, what this paper is intended specially to emphasise, that the early indications, curative as well as prophylactic, are in every case the correction of gastric disturbance, and the reduction of excessive arterial tension.

SOME RECENT OBSERVATIONS ON DISEASES OF CHILDREN.

A REVIEW.

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Much has been written on the importance of using a sufficiently high proportion of fat in the feeding of infants, and there is no doubt about the evils which may result where fat is deficient, but the opposite fault, excess of fat, has attracted but little notice. Holt (*Archives of Pediatrics*, Jan., 1905) draws attention to the serious disturbance of nutrition which may result from the use of food-mixtures containing too high a proportion of fat. A percentage of 5·7 instead of 3·4 per cent. may appear to suit the infant for a time, but is likely, sooner or later, to cause trouble; he quotes the case of an infant who was having 6 per cent. of fat in a mixture of top-milk and water; there had been rapid progress in weight and development until the age of eight months, when he weighed 21 pounds. Then convulsions occurred, followed by laryngismus stridulus and tetany, and the child was ill for three months with wasting.

He mentions other cases, in which infants, taking milk-mixtures which contained 6–7 per cent. of fat, developed convulsions, and notes that, in one case, chronic constipation and rickets were also present, while in another the constipation was only overcome when the fat was reduced from 7 per cent. to 3 per cent. It is particularly noteworthy that in these cases the rise in weight may be rapid and steady for several months before the evil effects of the high fat percentage become apparent, and the disturbance produced may be quite gradual in its development; for instance, the appetite may gradually fail, so that for weeks the child will take hardly a third of his former food, and the weight ceases to rise, or may slowly and steadily fall, until the excess of fat in the food is stopped.

The fault has arisen sometimes from the idea that, by increasing the proportion of fat, chronic constipation may be overcome. The facts show that constipation may be aggravated by excess of fat in the food ; sometimes the rich milk of Jersey cows, or top-milk, has been used without regard to the percentage of fat which they contain. As Dr. Holt says, to have any clear idea of the correctness of this or that food for an infant, the doctor "must learn to think in percentages." Northrup (*ibid.*) made some observations which confirmed Holt's experience. He attempted to substitute for cod-liver oil, in the treatment of rickets, a super-fatted milk. The result of the high fat-percentage was constipation with hard dry fæces, and, at the same time, some vomiting from gastric irritation. The rarity of such results from cod-liver oil suggests that the toleration of fat depends, not merely upon the proportion, but also upon the kind of fat used. But it seems clear that even the fat of human milk may, when excessive, act as deleteriously as that of cow's milk. Northrup (*Archives of Pediatr.*, Dec., 1905) records a case in which an infant, being breast-fed by its mother, began to suffer from colic, frothy stools, and wasting. The mother had been taking little exercise, drinking a quart of milk daily, and forcing herself to eat much food in order to continue suckling. Her milk was found to contain 8·9 per cent. of fat, and although by care in dieting and some open-air exercise the fat was reduced to 4·9 per cent., the infant improved only gradually, after milk had been omitted altogether for several days, and had then been introduced only in extreme dilution.

That there are considerable differences between the fat of human milk and that of cow's milk is certain. Stern (*Archives of Pediatr.*, June, 1905) points out that the proportion of volatile fatty acids in cow's milk is nearly six times as large as that present in human milk, and, even physically, there are well-marked differences; for instance, the fat in human milk is in much finer emulsion than that in cow's milk, and so is easier of direct absorption. Determination of the fat in the fæces of infants has shown that much more of the fat in human milk is absorbed than of that in cow's milk. Stern advocates the use of the yolk of hen's eggs to supply the fat necessary in infant feeding, where there

is difficulty in digesting milk fat. Yolk fat is well borne by infants, while the residue of yolk fat, passed in the fæces, is less than that of any other animal fat. The yolk must be given raw, and a quarter of a teaspoonful at a feed may be sufficient. According to Stern, the yolk contains 48·2 per cent. of fat, and the amount required daily is to be calculated on this basis; milk fat is to be excluded altogether, or nearly altogether, from the diet in the meantime by using only skimmed milk.

INFANTILE DIARRHŒA.

The ætiology of diarrhœa in infancy has been the subject of speculation and investigation for many years, and individual observers have concluded, from their own researches, that this or that micro-organism was the chief factor; but seldom, or never, has such an ideal example of scientific co-operation been presented, as in the recent study of diarrhœal diseases of infancy reported from the Rockefeller Institute for Medical Research. In a series of twenty-four papers, some dealing with the bacteriological and some with the clinical aspects of infantile diarrhœa, the *rôle* of the bacillus dysenteriæ (Shiga), in this connection, is thoroughly investigated by a body of workers, the results of whose observations are co-ordinated, and summarised by Flexner and Holt. The bacillus dysenteriæ was found in the mucus of the stools, or in the intestinal mucosa in fatal cases, in 63·2 per cent. of the cases examined. It was very rarely found in fæcal matter, but almost always where there was mucus or blood in the stools. The blood of infants, suffering from diarrhœa, sometimes shows marked power of agglutinating the bacillus of dysentery, a point which seems to favour the view that this bacillus bears a causal relation to the diarrhœa. An examination of the stools of 30 healthy children, under four years of age, did not show this bacillus in any case; scrapings from the mucous membrane of the intestine in 24 infants, who died of diseases other than intestinal, showed the bacillus only in three, and, in each of these three, the colon was found to be in a catarrhal condition at autopsy, and the stools in two of them had contained mucus before death. Flexner, whilst admitting the possibility that the bacillus dysenteriæ may prove to be one of the

occasional, or regular, bacteria of the normal intestine, and that it may acquire its pathogenic properties only under certain conditions, points out that there is some evidence of contagiousness in the diarrhœa of children, as in the bacillary dysentery of adults, and that therefore, as a practical precaution, the danger of entrance from without of specially pathogenic examples of the micro-organism is not to be disregarded.

It is noteworthy that, with the cultures of the bacillus dysenteriæ, there were often associated growths of streptococci in large numbers, and it may be that these play some part in the production of the diarrhœa.

The clinical records of the cases, in which the bacillus dysenteriæ was demonstrated, show certain points of interest: and perhaps the most striking is the great variation in the severity of the disease. Some cases could only be classed as the mildest form of intestinal indigestion, some were severe and acute cases of diarrhœa, such as are labelled clinically, acute ileocolitis. Many of the infants had been exclusively breast-fed; in one series of cases, 20 per cent. had been kept at the breast; the number of stools per diem was not more than 3 to 5 in some cases, while in others it was 12 to 15; in some cases, the whole disturbance lasted only a few days, in others, the illness lasted several weeks; some were acutely ill, some were in a condition of chronic marasmus, with unhealthy, but not always very frequent, stools.

The morbid anatomy of the fatal cases also showed nothing constant, or characteristic. In many cases there was only "slight congestion" of the mucous membrane of the small or large intestine, in some, there was enlargement of solitary follicles, or Peyer's patches, in a few, some superficial erosion, follicular or otherwise; only very rarely was there found that intense inflammatory change, which results in the formation of membrane-like patches on the mucous membrane of the intestine. None of the observers were able to trace the bacillary infection to any particular source; but cow's milk, at any rate, may be exonerated in those cases where breast-feeding had been used exclusively. Holt suggests that the infection may be waterborne, but of this there is no proof. It was noted that, in rare instances, small ward epidemics

occurred; but it seems improbable that there is any great risk of contagion, although undoubtedly the occasional spread of infection, apparently by the excreta, suggests the importance of preventing contamination of food, or water, by persons handling the child's napkins.

The treatment, suggested by the bacteriological findings, is serum injection, and, for this purpose, an anti-dysenteric serum was used in 83 cases; 38 of these died; only 12 showed any noteworthy improvement following upon its administration. Holt, however, does not consider that the serum has yet had adequate trial. He points out that, in subacute infections, or in cases with much marasmus, the symptoms relate much more to the functional disturbance of digestion than to the specific toxæmia of the dysentery bacillus.

The serum treatment is adapted rather to the sharp acute attacks in infants, or older children with some powers of resistance, where the real problem is to combat the infection rather than to maintain nutrition. The several observers, whose reports deal with cases treated by serum injection, are almost unanimous in their opinion that it had no curative value; in a few cases only did some improvement follow its use, and in these, the reporters, with wise scientific reserve, express no dogmatic opinion as to the improvement being due to the serum. In some of the reports, it is specially stated that the serum had no ill effects; but in one it is mentioned that the injections "seemed to cause great pain," and whether the pain is great or little, this must always remain an objection to such methods of treatment, especially for children, and a good reason for abandoning them, unless there is very clear evidence that their therapeutic value is sufficient to warrant the infliction of pain.

DISEASES OF THE THYROID GLAND IN CHILDREN.

The rarity of affections of the thyroid gland in children, has, no doubt, led to the recording recently of several instances of disease in this gland. Congenital absence of the thyroid is familar enough now, as the usual cause of cretinism, but occasionally the gland is affected in children apart from cretinism. Several cases have been recorded of exophthalmic goitre in children. In one recorded by Lawson (*Trans. Soc.*

Dis. of Children, Vol. IV.), the patient, a girl, aged 12 years, showed first prominence of the eyes, and six months later, enlargement of the thyroid; but several cases, at a younger age, have been recorded. Wautski (*Med. Wochenschr.*, 1901) reported the case of a boy, aged five years, who had suffered for three months from exophthalmos, and enlargement of the thyroid gland, his pulse was 120, and he showed Moebius' sign (defective convergence of the eyes), and some incoordination of his arms, when they were extended. An even younger patient was reported by Variot (*Gaz. des Mal. Infant.*, Vol. IV., No. 3), a boy, aged 4½ years, after an attack of whooping-cough with broncho-pneumonia, developed exophthalmos and goitre, with marked tachycardia (pulse 152–168), anæmia, and attacks of diarrhœa. He improved much in two months.

Enlargement of the thyroid is sometimes seen without other symptoms, and may be a congenital condition. From some observations, made by Perrands (quoted in *Archives of Pediatr.*, 1902, p. 917) it would seem that congenital syphilis may cause marked changes in this gland in the newborn, and may determine a great enlargement from formation of fibrocellular elements. Coulon (*Archiv. de Méd. des Enfant*, 1904, p. 36) reports a case which seems to confirm these observations. An infant, born of syphilitic parents, was found at birth to have enlargement of the thyroid; there was no other evidence of syphilis in the child, but the known facts of its parentage suggested the administration of mercury, under which the thyroid enlargement entirely disappeared. A remarkable association has been noted between the administration of potassium chlorate to the pregnant mother, and the occurrence of enlarged thyroid in the infant at birth. Fothergill (*Journ. of Obstetr.*, Jan. 1904) records a fifth instance of this association. A woman, aged 37, had been given potassium chlorate, during pregnancy, to prevent abortion. During the last few weeks of pregnancy, she had also taken tabloids of thyroid. The infant, a female, died a few minutes after birth, from the presence of a large thyroid tumour, which, on examination, showed general hypertrophy of the thyroid. The gland was seventeen times the normal size.

A case of cystic enlargement of the thyroid at birth has been recorded (*Canad. Lancet*, March, 1905) in a female infant, who died at the age of nine days, after several attacks of dyspnœa, apparently from the interference with respiration, which was caused by the tumour in the neck. The thyroid was found to be indurated, and full of cysts containing clear fluid.

Acute inflammation of the thyroid gland, in a child of three years, who was recovering from erythema nodosum, was recorded many years ago by Barlow (*Clin. Soc. Trans.*, Vol. XXI.). In that case, the temperature was raised to 101°–102°, and the enlargement of the gland, with which at first there was pain in the neck, lasted about a fortnight. It has been stated that an acute inflammatory enlargement of the thyroid gland is sometimes associated with acute rheumatism. Money (quoted by Barlow) observed such an acute swelling in a girl of 12 years, who had had acute rheumatism, but as menstruation had begun two weeks before the swelling of the thyroid occurred, it seems possible that the swelling may have been related to the onset of menses rather than to the rheumatism. The association with acute rheumatism had been recorded also by Molière of Lyons in 1873, and recently Clemens (*Archives of Pediatr.*, Oct., 1905) states that, in a series of 13 consecutive cases of parenchymatous goitre in children (12 of whom were girls, and all at ages varying from 8 to 12 years), rheumatism was present in all, and in 3 there was advanced chronic endocarditis. In all the rheumatism appeared to have preceded the enlargement of the thyroid.

Acute inflammation of the thyroid gland, ending in suppuration, occurred on the 15th day after vaccination, in a child of 2 years (*Rev. de Clin. Pediatr.*, Vol. I., p. 599); the condition was found to be due to a streptococcal infection. But, in some cases, no cause can be found. Carpenter (*Trans. Soc. Diseas. Childr.*, Vol. III.) observed an acute enlargement of the thyroid, ending in suppuration, in an infant aged 14 months, without obvious cause, and refers to a case in a girl, aged 11 years (*Pediatr.*, 1900, p. 508), in whom the acute swelling, which was associated with fever, hoarseness, and difficulty of breathing, came without apparent cause, and disappeared without suppuration in 8 days.

HÆMORRHAGES IN THE NEW-BORN.

Hæmorrhage within a few days after birth has long been recognised as one of the most dangerous affections of this period, but, although the occurrence is no great rarity, its explanation is still obscure. It is easy enough to understand why hæmorrhages in the meninges, suprarenals, or other viscera, should occur in the still-born, or in infants dying within a few hours after difficult labour, and, as Spencer showed (*Obstet. Trans.*, XXXIII., 256), a large proportion of such infants show internal hæmorrhage in various parts; but the cases, in which an infant, within a few days after birth, begins to bleed profusely from the stomach, or bowels, or navel, or other external part, are by no means easy to explain. It seems likely that some are the result of a septicæmia, but it may be doubted whether it is wise to assume that the symptoms which have been described as melæna neonatorum, Winckel's disease, hæmorrhagic disease of the newborn, &c., are all to be referred to one cause, namely, "infections of the new-born," as Hamill and Nicholson have proposed (*Archives of Pediatr.*, 1903). They record 6 cases, all fatal within 19 days after birth, and all showing, on examination of the blood taken after death, micro-organisms, which may have accounted for the symptoms. In 2 of these cases, hæmorrhage had been a marked clinical feature; in 1 there was constant bleeding from the mucous membrane of the mouth, together with some bleeding from the bowel; in the other there was oozing of blood from the matrix of the nails in the fingers, beginning on the 5th day, with jaundice, and followed by severe hæmorrhage from the mouth, vagina, rectum, and umbilicus, and death at the age of 7 days. In the former case, the blood yielded staphylococcus pyogenes aureus, and bacillus aërogenes lactis; in the latter, the blood showed only staphylococcus aureus. In neither case was syphilis stated to be present.

That syphilis is at least a contributory factor has been the opinion of many observers. In a series of twelve cases of spontaneous hæmorrhage in the new-born, two at least were attributable to congenital syphilis (*Abt. Journ. Amer. Med Assoc.*, Jan., 1903), and Miracek found endarteritis of

the small blood vessels in the submucosa of the alimentary tract, in cases of hæmorrhage in syphilitic infants. Wilson (*Archives of Pediatr.*, Jan., 1905) reports 10 cases, in which hæmorrhage in still-born infants, or in infants dying shortly after birth, was associated with definite evidence of syphilis in the child, or in its parents, and considers that the finding of various micro-organisms in the blood after death may point merely to a terminal invasion of the blood, and be in fact, an epiphenomenon of no importance, in the ætiology of the hæmorrhage condition, or, at any rate, not incompatible with a syphilitic basis of the hæmorrhagic disease. The actual cause of the bleeding, he suggests, may be degenerative changes in the blood and vessels due to syphilis.

There are, however, cases on record which suggest that no such general infection, syphilitic or otherwise, is necessary to produce some of the most severe hæmorrhages in the cases of melæna neonatorum; for example, Morris and Feldman (*B.M.J.*, Feb., 1905) report a case, in which an infant, 19 hours old, began to vomit blood, about a tablespoonful every hour. The hæmorrhage was apparently provoked by feeding, and subsided on treatment adapted to the supposition that a gastric ulcer was present. This lesion has been found in several cases, and in others, *e.g.*, in one reported by T. D. Lister (*Path. Soc. Trans.*, Vol. L.), a small ulcer was found in the duodenum just below the pylorus.

These cases of melæna, or hæmatemesis, in the new-born, although always extremely dangerous, are not necessarily fatal, and, of recent years, several cases have been recorded showing the value of the suprarenal extract in this condition. Adrenalin solution (1 in 1,000) has been used in doses varying from 1 to 5 drops, repeated at short intervals. Townsend (*Boston Med. and Surg. Journ.*, 1905) records a case in which gelatin, dissolved in water, was given by the mouth, while adrenalin solution was applied to the navel, which was bleeding profusely. Both the gastro-intestinal hæmorrhage and the umbilical bleeding stopped, and the infant made a good recovery. Holt recorded a case in which saccharated extract of suprarenal, one grain suspended in water, given every four hours, stopped the gastro-intestinal hæmorrhage after 12 hours.

Calcium chloride, in doses of half a gram every two hours, has been recommended as reducing the hæmorrhage tendency.

CONGENITAL LARYNGEAL STRIDOR.

The vexed question as to the mode of production of the stridor in these cases has again been raised by a recent contribution from Koplik (*Archives of Pediatr.*, Dec., 1905), who made a post-mortem examination of the larynx in a case which had died of broncho-pneumonia. The child, a male, was aged one year at the time of death. The respiration had been noticed to be noisy, and accompanied by a crowing noise, both with expiration and with inspiration, from the age of three weeks. This had become more marked at the age of 5 months, and had persisted ever since. Any attempt to look into the fauces was always followed by a stoppage of respiration and a loud inspiratory crow, like that of laryngismus stridulus. During the broncho-pneumonia the child had several convulsions, but was not rickety. The upper opening of the larynx is described as follows:—"The epiglottis was curved backwards, and lay over the superior opening of the larynx. The lateral borders of the epiglottis were in contact, leaving a slit, which varied from half a millimetre in its greatest extent from the top of the epiglottis to a millimetre and a half at the arytænoid cartilages, where the space between the aryepiglottic folds was a little wider than above. The aryepiglottic folds were almost in contact, and were thin and membranous." The larynx showed nothing else abnormal, except that it was found impossible to introduce the smallest size one-year intubation tube between the cords without great force; so that it was concluded that this aperture was narrower than normal. The thymus was large, and weighed 25 grams.

The description given corresponds closely with that reported by Dr. D. B. Lees (*Path. Soc. Trans.*, 1883), and both observers consider the anatomical condition to be sufficient explanation of the croaking respiration.

Thomson and Turner (*Brit. Med. Journ.*, December 1, 1900), however, whilst agreeing as to the anatomical peculiarity of the upper opening of the larynx in these cases, regard it as an acquired deformity, not a congenital malformation. They

found that, by introducing a tube into the trachea after death, and exerting forcible suction from below, in imitation of forced inspiration, they produced alterations in the form of the upper aperture of the larynx, almost exactly resembling those found at autopsies on infants who had died of congenital laryngeal stridor. Repetition of the experiment soon produced some enduring alteration of the same kind. Thomson and Turner concluded, therefore, that the peculiarity found, in these cases, was merely an exaggeration of the normal infantile type, and was due mainly, if not entirely, to a constantly recurring sucking-in of the upper aperture of the soft larynx, and this sucking-in they attributed to "the ill-co-ordinated and spasmodic nature of the breathing." The anatomical condition was, in fact, an acquired deformity, analogous to a pigeon breast. Koplik objects to this view on the ground that the anatomical finding is ample to account for the stridor, without any supposition of nervous inco-ordination, and that the peculiar conformation at the upper opening of the larynx is found too early to be an acquired condition, for instance in a case recorded by Refslund, which was examined at the age of 2½ months.

Massei (*Arch. Inter. de Laryng.*, 1905) also has recently expressed his opinion that, although the stridor is to some extent dependent upon nervous influence, it is dependent primarily upon a congenital malformation of the upper aperture of the larynx. It is difficult to understand how anyone, familiar with these cases of "congenital laryngeal stridor," could attribute them to pressure of an enlarged thymus, and it is satisfactory to note that Koplik considers the size of the thymus, in this case, as in no way connected with the obstructed breathing. Nothing but confusion is likely to arise out of the term "congenital thymic stridor." Hochsinger (*Rev. Mens. des Mal. de l'Enfance*, Mar., 1905) states that, out of 58 nursing infants examined with the X-rays, 26 showed hypertrophy of the thymus, and 20 out of these 26 showed congenital stridor, and he considers that the peculiar noise heard with respiration shortly after birth, and loudest at the end of inspiration, and without alteration of voice, is due almost exclusively to pressure of an enlarged thymus on the trachea. Obviously, such statements can only

refer to some condition quite distinct from that to which Koplik and Lees were referring, and a condition which is so rare that it may be doubted whether any one observer has seen 20 cases; moreover, if hypertrophy of the thymus is to be found in nearly 50 per cent. of nursing infants, as Hochsinger apparently finds, there might well be even more scepticism as to its rôle in the production of symptoms than at present; but until there is more agreement as to what degree of enlargement, as found at autopsy, constitutes "hypertrophy of the thymus," it would be rash to accept the very doubtful evidence of X-rays as proving any such enlargement. It seems possible that, in very exceptional cases, enlargement of the thymus might conceivably cause some undue pressure on the trachea, but when it is considered how soft and yielding the thymus is, and how comparatively firm and resistant the trachea is, even in an infant, and, moreover, how rarely enlarged caseous glands, and even sarcomata in the mediastinum, produce any tracheal or even bronchial obstruction, it seems at least unlikely that the thymus should cause any tracheal obstruction by direct pressure; and it is quite certain that not only does the thymus vary within very wide limits of size and weight, without any evidence whatever of its interfering with the child's health in any kind of way, but that when it happens to be of a weight near the maximum limit of this variation, and within those limits which some would describe nowadays as "hypertrophy of the thymus," there has not been the least interference with respiration. Cases, however, are on record in which it is supposed that some such obstruction occurred. Jacobi (*Archives of Pediatr.*, March, 1903, p. 181) referred to a case (Koenig's) in which symptoms of suffocation existed, and the thymus was drawn out of its position somewhat, and part of it removed, and the infant recovered. The exact nature of the symptoms is not stated, so that the bearing of this case upon the subject of congenital stridor is uncertain. A recent instance of congenital stridor, in which operative measures were tried on the assumption that the symptoms were due to enlarged thymus (Morse, *Arch. Pediat.*, December, 1905, p. 888), seems rather to prove that, in that particular case, at any rate, these

symptoms were not due to the thymus ; for, although dyspnœa at first ceased when the thymus was pulled up, it recurred a few days later in spite of operative fixation of the thymus in the position which at first relieved. But even if the thymus is to be held responsible, in very rare cases, for some obstruction to breathing, it seems probable that, as Thomson and Turner point out, the symptoms therefrom, being those of tracheal obstruction, will be found to be different from those of the "congenital laryngeal stridor," if the view is correct that, in these cases, the croaking noise is produced in the larynx.

PELLAGRA OCCURRING IN ENGLAND.

By ANDREW CASSELS BROWN, M.D.
(*Rock Ferry.*)

THE rarity, I might almost say the non-existence, in this country, of cases exhibiting indubitable symptoms of poisoning by grain, has induced me to publish details concerning the very remarkable illness of a patient, who came under the care of my partner, Dr. Carruthers, at the beginning of December, 1905. On the morning of the 9th, I received a telephonic message from him asking me to meet him at the patient's house, and on arriving there he gave me the following history of the case. The patient, a young woman of somewhat poor physique, aged 21, had been in a very indifferent state of health for about ten or twelve months previous to sending for medical assistance. In particular, she had complained of a severe and persistent headache, accompanied by a feeling of great lassitude, much depression of spirits, and a disinclination to undertake any exertion, either of mind or body. In addition to the headache, she had suffered from vague pains in the side, and from more or less well-defined pains in the fingers, ankles, toes, limbs and backbone, especially in the lumbar and sacral regions. These pains were attributed to rheumatism. For about three or four months before she came under observation, she had been unable to walk more than fifty yards, without experiencing what she described as a severe weakness in the legs, which at times caused her to stumble and fall. She had also fainted upon several occasions. Her appetite was extremely poor, especially in the morning, and she suffered greatly from constipation, often going for more than a week without an evacuation. Her mother informed us that, during the whole of the period under view, her daughter's temper had been very bad indeed. Finally, the pains in the back and sides became more intense, and were accompanied by a feeling of tenderness all over the body, while progressive feebleness, and fainting attacks necessitated her remaining in bed. The constipation had also become so aggravated that it had been found necessary, a day or two before my partner saw the

case, to come to the aid of the purgatives administered, by removing the hardened fæces with the fingers.

When he did see the case, the clinical picture had considerably changed from the description given above, more particularly, as regards the constipation, which had been succeeded by a severe diarrhœa, the stools being most offensive and typhoid in type. There was also an extraordinary degree of salivation present; indeed what struck one most, on seeing the patient, was the reiterated persistency with which she put her handkerchief to her mouth, in order to catch the increased buccal discharge. As the symptoms had not changed at all during the few days before my visit, I propose to detail them as we found them on the 9th.

The patient, who was not particularly well developed, tossed restlessly about, as she lay in bed. The eyes had a bright but anxious look, and there was a marked malar flush. The temperature was 103·8° F. (it had varied between 103 and 104° F. for the past few days). The pulse showed a frequency of 126 beats per minute, was regular in time and rhythm, but thin, easily compressible, and of low tension.

Alimentary System.—The lips were pale, but showed no herpetic eruption. The gums were also pale. The teeth were badly decayed. The tongue resembled a piece of raw beef, intensely red at the tip, and elsewhere covered by a whitish glairy-looking fur. In the left half of the soft palate could be seen a small but deeply punched-out ulcer, surrounded by a zone of deep congestion. The pharynx was highly congested, and the tonsils somewhat swollen. Two or three small ulcers of the type already described were to be noticed in either tonsil. Deglutition was somewhat painful. Salivation was profuse.

Subjectively, as regards appetite, it was noticed, throughout the whole course of the disease, that the patient had an ardent craving for such articles of diet as stewed steak and onions, pine-apple, &c., &c. Inspection of the abdomen revealed the existence of little or no distension. A few pale spots were to be seen on the surface, but these had been caused by a mustard poultice, which had been applied some days before.

The least touch of the abdominal wall caused the patient to wince badly, but the tenderness was not confined to any particular region, being common to all parts of the body. This tenderness prevented any rigorous examination from

being made, but some slight "gurgling" could be distinguished in the right iliac region.

On percussion, the liver was normal in size, and the spleen was not enlarged. There was no vomiting, but the patient passed as many as twelve or fourteen stools in the twenty-four hours. The stools were of the nature of pea-soup and most offensive. They contained neither blood nor slime, but frequent undigested milk-curds.

As regards the *circulatory system*, the pulse has already been described. The heart sounds were normal in all areas, but even the pressure exerted by a binaural stethoscope upon the præcordium was more than the patient could comfortably stand.

The Respiratory System requires no particular mention, save that the breathing was somewhat quick and short.

Urinary System.—The urine, though concentrated and of high colour, contained no abnormal constituents.

Hæmopoietic System—As regards the blood, Widal's test gave a negative reaction. A stained blood film exhibited the following features:—Colour index somewhat below 1, as regards the red blood corpuscles. Leucocytes markedly increased, especially the polymorpho-nucleated variety. The lymphocytes, if anything, seemed to be decreased.

Integumentary System.—The skin was abnormally dry and rough, perspiration being absolutely in abeyance. There was a slight papular eruption upon the outer aspect of the right knee and ankle, and on the outer surface of the leg between these two points.

With reference to the nervous system, the patient complained of severe headache, tenderness all over, and inability to walk. Intellectually, she showed no diminution of mental power, indeed her intelligence seemed to be particularly acute, and she evinced an anxious interest in all the details of her illness. Sleep was naturally very bad, and occasionally at night there had been some slight delirium. She spoke in quick jerky sentences.

As regards motor power, the patient was able to sit up in bed, move all limbs, and overcome a considerable amount of resistance offered to arm or leg. Co-ordination was normal. The muscles generally were wasted and flabby.

There was a marked hyperæsthesia everywhere, and the patient greatly objected to the slightest pressure being put upon any portion of the body. The abdominal reflexes were

exaggerated. I was inclined to think that the abdominal muscles exhibited slight idiopathic contractions when tapped. There was a good deal of pain and tingling in the fingers and toes, such as suggested the presence of a peripheral neuritis. The knee-jerks were absent. There was no ankle clonus. The organic reflexes were normal.

The space at my disposal will not allow of a more detailed account of the various symptoms observed, but I do not think I have omitted any clinical features of importance. So unusual, however, were some of these that it was not at all easy to arrive at any definite diagnosis. One's difficulty was further temporarily increased by the fact that the patient gave a flat denial when questioned as to whether she had been in the habit of eating maize. Three days later, however, she confessed to her mother that, for eighteen months or more, she had daily taken a handful of a mixture of maize, rye, and barley, with which she used to feed the poultry, had put it into her pocket, and, with a view of curing the constipation from which she habitually suffered, had eaten it at intervals during the day. The immediate cause of the severe symptoms was supposed to be a tainted black pudding, of which the patient had partaken along with the rest of the family. None of the relatives however, had suffered any inconvenience from the food, and, on enquiry at the village shop, I was informed by the man in charge that he had sold 60 or 70 puddings during the same week, and had had no other complaints. It was interesting to discover that many of the hens and chickens had died about 10 or 12 months ago, and that this fact had been attributed, by the girl's parents, to the poor quality of the maize supplied. They said it had been, at that time, particularly dirty and musty.

As regards treatment, the patient was fed upon whey and broth made from mutton and various meat extracts, for it had been found that she was incapable of properly digesting even greatly diluted milk. Tepid spongings were ordered in order to reduce the temperature, and the following prescription given :—

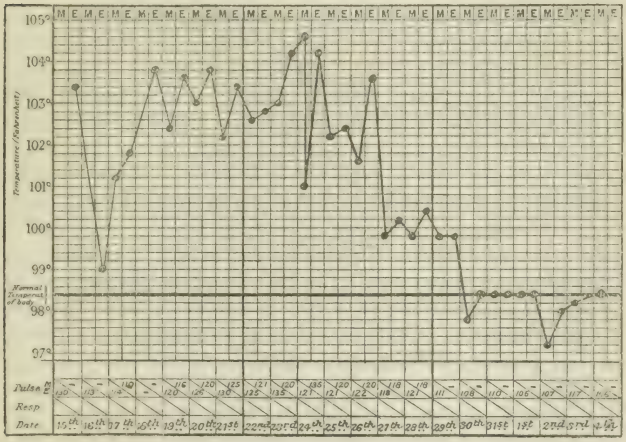
℞ Bismuth. Oxychlor. } - - - āā ʒij.
Salol. - - }
Mucilag. Recent. - - - - q.s.
Aq. Cinnamon. - - - ad ℥vj.
Sig. ʒs. 3 horis ex aq.

For the next few days the patient made no sort of progress, and it was especially noticed that the papular rash appeared on the other leg, and was more marked, and somewhat redder than it had been. On the 13th the medicine was stopped, and the following drugs substituted :—

Potass. Chlorat. - - -	gr. xxx.
Ac. Hydrochl. - - - -	ʒi.
Quin. Sulph. - - - -	gr. xxiv.
Syr. Aurant. - - - - -	℥i.
Aq. ad - - - -	ʒxij.

Sig. ℥i. every three hours.

By the end of a week, the gastro-intestinal symptoms had decidedly improved. The tongue was markedly clean, and the ulcers in throat and palate had disappeared, and the stools, though still fairly frequent, were less offensive. The temperature, as will be seen from the chart, after experiencing a decided


105°
104°
103°
102°
101°
100°
99°
98°
97°
Temperature (Fahrenheit)
Normal Temperature of body
M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E M E
Pulse
Resp.
Date
15th 16th 17th 18th 19th 20th 21st 22nd 23rd 24th 25th 26th 27th 28th 29th 30th 31st 1st 2nd 3rd 4th

fall on the 16th, shot up again, and remained as high as ever. The hyperæsthetic symptoms, the salivation, and the eruption all continued unabated, and the patient was very ill indeed.

On the 21st, to make matters worse, there was a sharp uterine hæmorrhage. Was this due to the quinine, or might it have been caused by a tainted rye ? As a precaution, the quinine was eliminated from the mixture, and, to control the

diarrhœa still more, cachets containing 5 gr. of salicylate of bismuth were given three or four times daily. On the 24th, the temperature reached the highest point recorded, 104·6° F., and, for three days, the patient's condition was fairly desperate. On the 27th, it fell to 99·8° F., and, after hovering about 100° F. for three days, it came down to 97·8° F. on the 30th. With the decline of the temperature, the diarrhœa, the hyperæsthesia, and the salivation improved, and by the middle of January had practically disappeared. The papular eruption became, on the whole, more evident, and was now associated with a considerable degree of desquamation. The eruption never showed any signs of becoming vesicular or ulcerative. From this time the patient made an uninterrupted, though slow, recovery, and, by the end of January, in spite of a persistently quick action of the heart, felt better than she had done for many a long day. Her knee-jerks had reappeared. Of late, her hair has fallen out in large quantities.

The main interest of the case naturally centres round the differential diagnosis. This must inevitably be difficult when a disease presents a set of symptoms, that are common to many well recognised clinical entities. The pyrexia, the typhoid stools, the headache, and vague pains, the depression, and the rash might have been found—more or less—in enteric fever, in acute general miliary tuberculosis, in the gastro-intestinal form of epidemic influenza, in pyæmic and septicæmic conditions, in typhus, in various intoxications, and in tubercular peritonitis. This being the case, it was necessary to ferret out a symptom or two that might be pathognomonic of one particular disease. The symptoms which gave one food for reflection in this case were the disturbances referable to the nervous system, the condition of the skin, and the salivation. In particular, the presence of the last-named feature, when taken in conjunction with all the rest, had the decided effect of reducing the number of possible complaints to three, namely, mercurial poisoning, mushroom poisoning, and pellagra; but, having regard to the girl's occupation, the time of the year, and the country in which she resided, these all seemed to be hopeless impossibilities. The first was eliminated by the fact that the gums were normal, and that the patient had never had to handle the metal; the second, by the fact that there were no mushrooms to eat in December,

and that she had not eaten any; and the third by the fact that she lived in Cheshire, and that she had not, as she persisted, partaken of any maize. One could not help feeling, however, in spite of this denial, that the whole clinical picture of the case pointed, with more or less certainty, to pellagra, and when the confession was made a few days later, it seemed that there could be no further reason to doubt that such was the true diagnosis. But I do not find that the symptoms of the case under notice altogether agree with the published descriptions of the disease by Osler,[1] Clifford Allbutt,[2] and Ludwig Berger,[3] whose monograph was translated by Dr. Barendt, and published by the New Sydenham Society, in 1893, more especially with regard to the acuteness of the attack which I have described. These authors make no mention of the marked pyrexia to which I have alluded, nor do they draw any special attention to the neuritis and general hyperæsthesia, though it is mentioned by Clifford Allbutt, and the erythema is stated to appear, as a rule, upon those parts which are exposed to the rays of the sun, which—for the reason, perhaps, that there is not much sun in this country—was certainly not to be seen in our case. Taken together, however, the symptoms exhibited tally very fairly closely with those described as typical of the second stage of pellagra, by Berger; and one may, perhaps, be justified in supposing that the case was more acute because the girl ate her musty maize raw and uncooked, whereas the loaves eaten by the Italian peasantry are, at any rate, half-baked. Fortunately, whatever may be the fate of the Fiscal Policy, the British nation is not likely to be under the necessity of eating maize; and I think the case I have just related, bids fair to remain unique in medical annals for many years to come.

It is, so far as I know, though I speak under correction, the first case of pellagra ever recorded in this country.

[1] Osler: *Principles and Practice of Medicine*, second edition, 1895.
Clifford Allbutt: *A System of Medicine*, Vol. II., 1902.
Selected Monograph on Dermatology, New Sydenham Society, 1893.

Prize Essay.

THE TREATMENT OF INNOMINATE ANEURISM.

By G. G. MACDONALD, M.A., M.D., Ch.B.,
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GENERAL CONSIDERATIONS.

In the treatment of this most formidable affection there are several points belonging to the domain of pathological anatomy which are of the greatest importance in scientific treatment, for an ignorance, or neglect of these might result in therapeutic failure, or even compass the life of the patient.

The Seat of the Aneurism.—It is exceptional to find the aneurismal dilatation limited to the middle part of the artery. It may affect the whole of the innominate trunk without involving the neighbouring vessels, a disposition which Holmes regarded as more frequent than is usually supposed. Much more frequently, however, the aneurism develops at the distal end of the innominate, involving the origins of the subclavian or carotid arteries, or both, but in the great majority of cases the aneurism has its seat at the proximal extremity of the artery, in which case it is merely an extension of an aneurismatic condition of the aortic arch. An aneurism involving the aorta, innominate and both subclavian and carotid arteries is not uncommon. The sites most favourable for operation by ligature are the rarest, and the commoner varieties are those which are least adapted for such a procedure, a circumstance which largely accounts for the disfavour into which, especially on the Continent, the operative treatment of innominate aneurism has fallen.

The Form of the Tumour.—Innominate aneurism is usually saccular in form, a fact favouring coagulation of the blood within the aneurism. Poinsot, however, describes several cases of fusiform dilatation.

The size of the tumour varies enormously. The largest described is by Hampeis, in which the aneurismal tumour extended from the level of the larynx to the epigastrium.

Pouches and diverticula are common. Wardrop had a case in which the sac sent a prolongation along the trachea, another along the clavicle, and a third upwards and outwards as far as the border of the trapezius. Clotting of blood in these diverticula is frequently present, and the coagulation, extending to the main dilatation, may lead to a great reduction in the volume of the sac, or even to the spontaneous cure of the parent aneurism.

Pressure Effects.—Besides pressure effects on the trachea and œsophagus, which may be displaced, ulcerated, or penetrated, and those on the vagus and recurrent laryngeal nerves, brachial plexus, and sympathetic leading to dyspnœa, liability to broncho-pneumonia, changes in the voice, &c., there are certain pressure effects, the absence of which must be negatived before operative interference is commenced, viz., those on the vessels. When the tumour is still contained in the thoracic cavity, it presses on the aorta, the superior vena cava, and innominate veins, and even on the heart itself, greatly increasing the risks of anæsthetic and shock. The veins compressed may become obliterated, and when several of them are obliterated, as in a case cited by Watson, in which both jugulars, both subclavians and both innominates were completely closed, symptoms of the most complex nature arise, indicating great discretion in the ligature of veins when operating at the base of the neck for this condition.

Of still greater importance is obliteration of the arteries which arise from the innominate trunk, for in some cases, though exceptionally, their closure may lead to spontaneous cure of the aneurism. The carotid alone, the subclavian alone, or both of these trunks, may be closed simultaneously. Again, in some cases it is the vessels on the left side which are occluded, and, in a case of Hughes, the carotid and subclavian arteries on the left side were closed, and the circulating blood passed all through the sac. The effects of ligature in such a case would be manifestly disastrous.

The closure of the right carotid alone, or of both right carotid and subclavian, has led to spontaneous cure (Ogle, Mazet, Wishart), but this is such an exceptional and uncertain occurrence that no hope or reliance can be founded upon it.

The sternum, vertebræ, clavicle, and ribs may be eroded;

the clavicle may be dislocated at one or at both ends, and, in the latter case, it moves about unattached on the surface of the tumour.

MEDICAL TREATMENT.

Absolute physical and mental rest in the supine posture, aided if necessary by the exhibition of aconite, belladonna, or opium, frequent purgings and bleedings, in order to reduce to a minimum the force of the heart—a treatment recommended by Valsalva—has succeeded in some cases in effecting a cure. Head has cured a case by Tufnell's regime, absolute rest and rigorous diet, with reduction of fluids to a minimum (8 ozs. of liquids and 10 ozs. of solids per diem), and de Penzi has had good results with rest and the administration of large doses of potassium iodide, without such an extreme restriction in dietary. This is now the favourite medical treatment adopted, but only patients with enormous courage are capable of subjecting themselves to such stringent self-denial, and the reduction is but slowly accomplished.

MILDER SURGICAL MEASURES.

These are always associated with careful medical treatment, rest, restricted diet, and attempts to increase the coagulability of the blood by the administration of large doses of potassium iodide alone, or along with the chloride, or lactate of calcium.

Injection of coagulants into the sac has been attempted, but in each case the results have been deplorable.

Injection of ergotine around the tumour failed entirely in Holmes's case, though Arnoldo found considerable improvement in a patient treated thus for an aneurism involving the innominate, subclavian, and carotid arteries.

Galvanopuncture.—Poinsot gives the results of 12 cases collected by him from the literature, 2 showed considerable improvement, in 4 the improvement was only temporary, in 3 there was no benefit, and 3 were worse than previously. Stewart and Salinger succeeded, however, in obliterating the sac almost completely in a man of 40 years of age, and the patient was alive after three years.

The application of the galvanic current to the surface has only had indifferent success. Galozzi found a remarkable improvement in one case after a few months' treatment.

Introduction of foreign bodies (horse hair, piano wire, &c.) into the sac has been largely rejected by most English and Continental surgeons, although several cases in America have quite recently been put on record, in which benefit has resulted.

Macewen's method has given several favourable results, conspicuously in a case of Bäumler's. The patient had an aneurism of the innominate and adjacent part of the aorta. Both carotids were obliterated, and the right subclavian had been ligatured without success. After 13 introductions of the needle, which was left in place for 6 to 8 hours, the swelling, originally the size of a hen's egg, became flatter and disappeared within a year.

Indirect pressure on the carotid has been tried in two cases, in one there was fair improvement, but the sac ruptured within a year, the other died of hemiplegia on the fifth day after commencing pressure.

Injection of gelatine (Lancereaux), though not necessarily associated with untoward results, has not given very favourable results in innominate aneurism, except that it greatly relieves the pain and improves the well-being of the patient. 200 grammes of gelatine (2·5 per cent) is injected subcutaneously every 4 or 5 days.

Galvanopuncture, Macewen's method, and the injection of gelatine are procedures adopted in cases quite unsuitable for ligature, or as methods promoting coagulation in the sac after ligature.

TREATMENT BY LIGATURE.

The aim of ligature is the entire exclusion of the sac from the circulation, thus favouring coagulation in its interior, and, on the organisation of the clot formed, the sac is finally obliterated and cure effected. The peripheral collateral circulation is established through the external carotid arteries, and for the operation to be successful there must be a possibility of this circulation being free, and therefore the absence of obliteration of the other arteries is of the highest importance.

Method of Anel.—Suitable for close proximal ligature are those cases only in which the aneurism involves the terminal portion of the innominate. Ligature of the innominate has

been done 6 times. Two were fairly successful, the other 4 terminated fatally.

The best method for exposing the proximal extremity of the innominate is by the method recommended by Rydygier at the Polish Surgical Congress of 1901. He directs his incision along the lower third of the inner border of the left sternomastoid muscle down as far as the left first rib, then transversely to the right first rib and upwards along the outer border of the right sternomastoid. The manubrium, the inner third of the right first rib, and clavicle are resected, and the flap raised exposing the vessels.

Ligature of the innominate even with healthy arteries is a very formidable operation, for, out of 35 cases in which it has been done, only 5 survived, and only 1 lived over six months.

Brasdor's operation of distal ligature is at the present date practically the only one applicable to innominate aneurism. Different modifications of this have been employed at different times. Wardrop ligatured the subclavian in 1827 for innominate aneurism, and Broca and Bryant repeated the operation. In all three cases the immediate result was good; but in none was cure effected. Ligation of the axillary and of the carotid has been often done, but with little benefit. The 6 cases in which the aorta was involved all terminated fatally; those in which the innominate was alone involved, showed two improved out of 13, and of the remaining 6, in which the bifurcation of the innominate was the seat of the aneurism, 4 died, and 2 were cured for 9 and 20 years.

The application of ligatures, first to the carotid, and, if no benefit is obtained, subsequently to the subclavian, was first tried by Flam in 1836–1837, with curative result. This is warmly recommended by Holmes. Of the 8 cases in the literature, 3 were cured and 5 died.

The carotid and axillary have been ligatured at different periods by Malgaigne and others with no success, and simultaneous ligature of these vessels has also given no favourable result.

The simultaneous ligature of the subclavian and common carotid arteries was proposed by Diday in 1842, and performed first by Rossi in 1844. In later years, the operation has been

frequently performed, and is a beautiful example of the progression of modern surgery. In 1869, Le Fort could only find 3 cases; in 1882, Poinsot was able to collect 23 cases; in 1887, the number of 32 was reached in Wharton's collection; in 1890, there were 56 cases on record; in 1900, 83; and up to the end of 1905, 89 cases are found in the literature.

Of Poinsot's 23, 8 were cured (*i.e.*, 35 per cent.). In Wharton's 32 cases, 12 (*i.e.*, 37 per cent.) are recorded as cures. In the 39 cases, between 1880 and 1890, 25 (*i.e.*, 64 per cent.) were cured, or improved for longer than one year. In the 27 cases, between 1890 and 1900, the cures, or long improvements, also exceeded 60 per cent.; and in the 6 cases, since 1901, 4 were cured and 2 died (*i.e.*, 66 per cent. of cures). The mortality from the operation, though very high in the earlier cases, was reduced in those between 1880 to 1890 to 17 per cent., and in those between 1891 and 1900 to 11 per cent.

Considering the gravity of the disease and the technical difficulties of the operation, the results of simultaneous ligature of the carotid and subclavian may be considered very good and encouraging. This must be regarded as the operation of election in innominate aneurism.

The exposure of the arteries for ligature is best accomplished by Mott's incision for ligation of the innominate artery giving an acute angled flap with resection of the sternomastoid, sternohyoid, and sternothyroid muscles. In the after-treatment, the chief points to guard against are septic infection of the wound, secondary hæmorrhage, and atrophy and stiffness of the arm. The atrophy of the right arm continued in Hirschman's case for four months, when the radial pulse was re-established. Soon after the arm attained to normal proportions. Secondary hæmorrhage is best combated by absolute rest, preliminary medical treatment, and, when begun, by firm pressure. If severe, it is usually fatal, from the diseased condition of the arteries. This complication is not so frequent in these days of asepsis.

CONCLUSIONS.

1. If no threatening pressure signs, one should always begin with careful medical treatment, by rest, regulated diet, and large doses of potassium iodide.

2. After a short time of medical treatment, or earlier if threatening pressure signs, simultaneous ligature of the right common carotid and right subclavian is the only operation to be recommended.

3. The operation is somewhat dangerous, and should not be attempted with obliteration of the right carotid, which would give rise to cerebral trouble, or with dilatation, or insufficiency of the aorta.

4. The operation should be practised at as early a date as possible, after a short time of medical treatment. Delay is dangerous, because more arteries may be occluded, and besides the older the aneurism the better developed the collateral circulation, and accordingly the less perfect exclusion of the sac from the circulation, and the less likely is a coagulation within it to occur.

5. Should the operation fail, or the aneurism be too large to permit the ligation of one or both of these arteries, Macewen's acupuncture should be given a good trial, combined with the subcutaneous injection of gelatine every four to seven days.

6. With the failure of the preceding measures, galvanopuncture, combined with medical treatment and protection of the sac from injury, is the last means at our disposal.

Prize Essay.

THE TREATMENT OF HÆMATURIA OF RENAL ORIGIN.

By J. E. BULLOCK, M.D. (Brux.), M.R.C.S.

Renal hæmaturia must be defined as the condition in which, as the result of some affection of the kidney, both blood cells and the colouring matter of the blood are found in the urine, and so does not include hæmoglobinuria, in which only the colouring matter is present, or hæmatoporphyrinuria, in which the colour is due to iron free hæmatin. The blood in the urine varies in quantity, is more or less altered in colour, and is usually intimately mixed with the urine. After standing for a little while, it settles and becomes a dirty brown colour, of all shades from almost black to a mere smokiness, the change being due to the conversion of oxyhæmoglobin into methæmoglobin. It is important to distinguish urine discoloured by blood from other dark urines (melanuria), such as carboluria, due to carbolic acid, urines stained by urobilin, or by the colouring matter of bile (biliverdin), dark urine in cases of melanotic tumours, indicanuria, which may occur in cases of intestinal obstruction, and alkaptonuria, in which the urine darkens from the surface downwards on standing. As said above, both blood corpuscles and blood colouring matter must be found. When coloured by blood, the urine is always albuminous, and more so when the blood is derived from the kidney. On settling in a conical glass, there is a brownish deposit depending on the amount of blood. If this deposit is centrifugalised, and some placed under the microscope, blood corpuscles can be detected, though they are often much altered, and may even have disappeared in stale urine. Minute blood casts, or coagula, may be seen. The blood-colouring matter may be detected by the spectroscope, if there is sufficient blood. The most applicable chemical test is that by guaiacum and ozonic ether. Assuming that the urine is not contaminated by saliva (from the patient having spat into the utensil containing it), and that he is not taking iodides, to 2 drachms of urine in a test-tube add 2 drops

of tincture of guaiacum (freshly prepared by dissolving resin of guaiacum in spirit) : a white precipitate of resin will result ; on gently adding 2 drachms of ozonic ether (made by shaking up hydrogen peroxide (containing 20 volumes of oxygen) with sulphuric ether and leaving it to stand for 24 hours), a blue colour will appear at once, or after a minute or two, at the junction of the fluids, if blood pigment is present.

In cases of some tumours of the kidney, or in ruptured kidney, blood may be discharged so rapidly in the urine that it is but little altered in colour. It may come either from the substance of one or both kidneys, or from the pelvis. When from the parenchyma, it is less in amount, more altered in colour, and shows, under the microscope, blood casts and casts of the renal tubules. When from the pelvis of the kidney, it is more abundant, and clots may form in the ureter, setting up pain on their extrusion ; there are no renal tubule casts. The most common causes of pelvic hæmaturia are pyelitis, calculus, and tubercle.

The treatment of renal hæmaturia depends entirely upon the cause. Some causes are obvious, and the line of treatment is correspondingly simple ; other causes are less obvious, and require careful consideration.

The treatment being that of the underlying disease, hæmostatic drugs are more especially called for, when the hæmorrhage is profuse. Chloride of calcium and supra-renal extract are the two most trustworthy drugs. Chloride of calcium acts by increasing the coagulability of the blood. As it is incompatible with milk, milk must be withheld during its administration ; it may be given in ½-drachm doses every four hours. If after six doses there is no effect, supra-renal extract, in doses of 5 grains every four hours should be given for 3 doses, then every six hours. If more immediate effect is called for, 3 grains of ergotin must be injected hypodermically, other remedies are ½-drachm doses of the liquid extract of ergot every hour or two hours ; acetate of lead, 2 grains every four hours ; tincture of hamamelis, 20 minims every four hours, and gallic acid 10 grains every four hours, but most reliance may be placed on chloride of calcium, supra-renal extract, and ergotin hypodermically.

Affections of the kidney giving rise to hæmaturia are nephritis, irritation from poisonous drugs, blood diseases, and

specific fevers, calculus, tumours, tubercle, parasites, embolism, injury, congestion, twisted or movable kidney, syphilis. In acute parenchymatous nephritis, there is always more or less hæmaturia, which lasts during the acute stage, and is accompanied by dropsy and epithelial casts in the urine. When slight, it does not require any special treatment beyond the treatment of the general kidney disease, by counter-irritation to the loins by dry-cupping, or mustard plasters, with diaphoretics, and purgatives to relieve the congested kidneys. Diuretics must be given with care, but boiled water flavoured with citrate of potash (a teaspoonful to a pint) is grateful, and useful in increasing the flow of urine.

Hæmaturia sometimes occurs in chronic Bright's disease (granular kidney), and may occasionally be very profuse. In this case, combined with rest in bed, the hæmostatics above mentioned must be used. The drugs especially irritating the kidney, and, when in excess, causing hæmaturia, are turpentine and cantharides. In addition to the discontinuance of either of these, the patient must be kept in bed, warmth applied to the back, and mild diluents, such as barley water and citrate of potash, freely given. Excess of cubebs or copaiba may also cause hæmaturia.

The specific fevers, in which hæmaturia occurs, are yellow fever and cholera, the blood diseases are hæmophilia, purpura hæmorrhagica and leucocythæmia. The treatment consists in the treatment of those diseases, and the use of the hæmostatics above mentioned. In scurvy, hæmaturia will cease when fresh foodstuffs are added to the dietary. In infants, it may be the only symptom pointing to scurvy. Hæmaturia also may occur in the course of malarial fever, and by some is attributed to excessive dosage with quinine. It is best met by discontinuing the quinine. It is a moot point whether malaria sets up the hæmaturia, or whether the hæmorrhage is due to excess of quinine, in any case, it is probable that, with hæmaturia, the time for the specific action of quinine is past.

Hæmaturia from renal calculus requires that the patient be kept in bed, while surgical measures must be taken for the removal of the stone, unless it passes down the ureter, or becomes encysted, and sets up no further bleeding. In calculus, the hæmorrhage is not often profuse, is not continuous, and subsides under perfect rest, it depends chiefly

on irregularity of the surface of the stone, the oxalic calculus being roughest. It closely resembles the hæmorrhage from early tubercle of the kidney, the distinctive characters being that it is dependent on movement, is accompanied by a sharp pain in the back, radiating to the testicle, which is consequently tender.

Slight hæmaturia may occur from the irritation of uric acid crystals, and in oxaluria. It must be combated by mild diluents, Contrexéville water, the bowels must be kept open, all sweets, pastry and alcohol avoided. Piperazine (15 grains three times a day) is useful in carrying off the uric acid.

Hæmaturia has been attributed to garden rhubarb. It may excite irritation, if there is any special susceptibility, as in gouty subjects. It is thought to be associated with an excessive formation of oxalates. Tumours of the kidney, causing hæmaturia, are, of simple growths, adenoma and papilloma of the pelvis; of malignant growths, sarcoma and carcinoma. Adenoma, or diffuse cystic disease of the kidney, is generally congenital, and affects both kidneys, the hæmaturia is sometimes intermittent over some years; only palliative treatment is of any avail. In rare instances it is unilateral, and if, by the cystoscope, it can be seen that the blood descends from one ureter only, and, by external examination, it can be demonstrated that the disease is limited to one kidney, the affected organ should be removed.

Papilloma of the kidney corresponds with the villous growth which occurs in the bladder. It is rare, and gives rise only to profuse hæmaturia. It may be suspected when violent hæmaturia occurs in old people, with no other symptom pointing to disease. If found on an exploratory incision, it is successfully dealt with by removal of the kidney.

Hæmaturia from malignant disease of the kidney is not always present, but, when it occurs, it is intermittent and very profuse, and, combined with an enormous size of the kidney, may be the chief or only symptom. Sarcoma can be distinguished from carcinoma by the fact that it is more common, and occurs in early life. Under five years of age it is often bilateral, and of very rapid growth; above that age it is unilateral, and of slower growth. Carcinoma is more common in men than in women, is often accompanied by varicocele of the affected side, from pressure on the renal veins, and shows

more cachexia. Renal carcinoma is not necessarily of rapid growth. The hæmostatics above mentioned will check the hæmaturia.

In renal tuberculosis, hæmaturia may occur at some time or other, especially in the early stages, when the papillæ are involved. Renal hæmorrhage is rare in the young child, when tubercular kidney is part of a general tuberculosis, miliary tubercle being deposited in the kidneys. It is also rare in the young adult, when it is usually secondary to tuberculosis of the bladder, or testicle (in the male).

When renal tuberculosis is primary, it usually attacks one kidney, the hæmaturia is not marked, and may be absent, by which it is distinguished from the hæmaturia of renal calculus, in which hæmorrhage (aggravated by exercise) is nearly always present. If the general health is good, and it is proved (by examination with the cystoscope) that the blood enters the bladder by only one ureter, and so, presumably, the other kidney is healthy, the affected kidney may be removed, taking care that the ureter is cut at some distance from the disease. If the tuberculous disease is slight, the affected tissue may be excised, or scraped away. Hæmaturia is occasionally due to hydatid disease, which occurs either beneath the capsule (when it may be felt as a projecting rounded tumour), or in the kidney substance. Fragments of the hydatid membrane, or small cysts, may be found in the urine, but otherwise the diagnosis can only be settled by exploratory incision. If hydatid cyst exists, it should be cut down upon, and enucleated, if possible, but in cases involving the kidney substance, nephrectomy is necessary.

In persons who have lived in tropical climates, the Bilharzia Hæmatobia may invade the pelvis of the kidney by travelling up the ureter from the bladder, and set up renal hæmaturia. The Bilharzia is more often found in persons coming from South Africa, Arabia, Persia, Western India, and Egypt, in the last-named country, constituting the "Endemic hæmaturia of Egypt." There is no specific treatment for the entozoon, though iodide of potassium in 20 grain doses has been found useful. The filaria sanguinis hominis may occasionally cause renal hæmaturia.

Renal infarction, or embolism of the kidney, may set up hæmaturia, when endocarditis occurs in a heart damaged by

old valvular disease, or as the result of ulcerative endocarditis or of pyæmia. No special treatment is applicable in these circumstances.

Injury to the kidney, as when that organ is crushed in a "buffer accident," or ruptured by a severe fall on to the back, will set up hæmaturia, varying in amount according to the extent of the injury. Absolute rest in bed must be enjoined, cold applied to the loins by Leiter's coil, or ice-bag, and hæmostatics given internally.

When the hæmorrhage is excessive, and continuous, an exploratory incision must be made. If the tear is small, it may be united by deep sutures. If one kidney only is damaged, and the patient is not suffering too much from shock, the possibility of removing the kidney must be considered.

Occasionally, hæmaturia will occur intermittently after a blow over the kidney, or a fall, and is probably due to a displacement of the kidney, causing passive congestion from pressure on the renal veins. This should be treated by rest in bed with milk diet. A firm supporting bandage (over a pad if necessary) is the best application for the dull aching pain in the back. Movable kidney requires the same treatment. This condition is more common in women, and, when accompanied by much straining, may cause hæmaturia.

Very occasionally, in appendicitis, the inflamed mass sets up hæmaturia by pressure on the renal veins; this will be relieved when the appendicitis is attended to. Active congestion and consequent hæmaturia may occur when extra work is thrown on the kidneys, as the result of a severe chill to the surface of the body, as in cold bathing, or other exposure to cold, or after extensive burns. The treatment consists in mild diaphoretics and diluents, with rest in bed. Very slight hæmaturia may arise from passive congestion in the course of liver, heart, and lung disease. The treatment is the treatment of those diseases. Some hæmaturia occurs after operations on the kidneys. Gummata in the kidney may cause hæmaturia, and require anti-syphilitic treatment. Senator has mentioned unilateral functional hæmaturia under the name of essential renal hæmaturia, but it is probable that the hæmorrhage is derived from some undiscovered lesion in the kidney.

THE PREVENTION OF SUMMER (OR EPIDEMIC) DIARRHŒA.

By J. T. C. NASH, M.D., D.P.H.,
Medical Officer of Health for Southend; Physician and Medical Superintendent Southend Borough Hospitals.

It is the usual custom to reckon four seasons to the year in temperate climates, each season being roughly of three months' duration. These seasons do not exactly correspond with the four quarters of the year (if reckoned as starting with January and ending with December). The months of the seasons are roughly :—

Spring	-	March, April, May.
Summer	-	June, July, August.
Autumn	-	September, October, November.
Winter	-	December, January, February.

Summer diarrhœa does not begin to become in any material sense epidemic until the middle of June, and it is not until the last part of July that it becomes explosive in character, remaining at a high level throughout August and the first week of September, but thereafter, at first gradually, and later more rapidly, declining. In order to designate the really seasonal period of *epidemic* diarrhœa, it would be more correct to state that it is a late summer and autumn affection of infants, of fulminant severity during August, and for two weeks preceding and succeeding this month.

The diarrhœa statistics of London are of sufficient magnitude to enable us to make trustworthy deductions from them. In the first place, it is evident that the disease is really only epidemic among very young infants.

Take, for instance, the age distribution of deaths from epidemic diarrhœa (infective enteritis) in 1904.

Sir Shirley Murphy tabulates[1] them thus :—

Under 1 Year.	1–5 Years.	5–20 Years.	20–40 Years.	40–60 Years.	60–80 Years.	80 Years and over.	All Ages.
2,347	457	5	2	10	29	6	2,356

[1] *Report of the Public Health Committee of the L.C.C. submitting the Report of the M.O.H. for* 1904, p. 38.

This clearly shows that over 82 per cent. of the deaths attributed to this disease occur among infants under 1 year of age, while an additional 16 per cent. occur among children under 5 years of age, leaving about 2 per cent. among persons over 5 years of age. Let us just note here that one half of these deaths at ages over 5 occurred in the age period 60–80. This is an age period when a comparatively large proportion of constituent population is on a milk diet under medical advice.

Probably the majority of the 457 cases under the age period 1–5 occurred among children really under 2 years. The figures, at any rate, justify the statements that fatal epidemic diarrhœa is practically negligible except among young infants, and that fatal epidemic, or summer, diarrhœa is essentially a disease of infancy. The philosophical mind at once inquires, Why is this?

Sir Shirley Murphy gives a very instructive table, showing the diarrhœa death-rates per 1,000 living in London and the other great commercial cities of England in the decennium 1894–1903, and in the year 1904.

DIARRHŒA DEATH-RATES PER 1,000 LIVING.

Towns.	1894–1903.	1904.
London	0·78	1·04
Liverpool	1·42	2·52
Manchester	1·34	1·37
Birmingham	1·27	1·76
Leeds	1·04	0·99
Sheffield	1·42	1·35
Bristol	0·62	0·51
Bradford	0·80	0·83
West Ham	1·23	2·08
Hull	1·46	2·08
Nottingham	1·18	1·37
Salford	1·55	1·66
Newcastle	0·78	0·51
Leicester	1·31	1·31

NOTE.—The above figures clearly show that, with but one or two exceptions, 1904 was a more fatal year for diarrhœa than the average.

The decennium figures justify the deduction that fatal *epidemic diarrhœa is, generally speaking, more prevalent in the great Midland and North-Western industrial centres than in London.* Again the philosopher inquires, Why is this?

On page 39[1] Sir Shirley Murphy gives in tabular form the death-rates for the period 1901–1902–1903 in each of the sanitary areas in London. This shows that Shoreditch, Poplar, Bermondsey, and Fulham are markedly more affected than other boroughs. Once again, Why is this?

Dr. Newsholme has shown[2] that, for the past 50 years, the infantile mortality of the country, as a whole, has been stationary, and that this stationary infantile mortality has been associated with a great decline in the general death-rate of the community. More vehemently than ever must the philosopher ask, Why is this?

Newsholme summarises[3] a table of Dr. Tatham's, showing the relative incidence of the various causes of infantile deaths. This table shows that deaths from tuberculosis, meningitis, and convulsions have decreased, that deaths from diseases of the respiratory organs have not appreciably altered; while there is a marked increase of deaths from diarrhœal diseases, both in rural and urban counties, during the years 1898–1902 as compared with the years 1873–77. These facts, *viewed broadly, indicate that the infantile mortality would have decreased in common with the decrease in the general death-rate of the community, but for the presence of diarrhœal diseases.*

Now, I have elsewhere[4] shown that a careful study of the average London diarrhœa curve reveals that for several consecutive years a fairly dead level of about an average of 12 deaths a week prevails from December to June. By the third week in June the number of deaths has reached 50 in the week (in other words, the weekly death-rate from diarrhœa in London during the latter half of June has quadrupled the winter and spring average). Thereafter the rate of increase rapidly rises, so that, by the first week in July, the number of deaths has risen to 100, and by the third week to 200. For the next fortnight, the figures remain at about this high-

[1] *Loc. cit.*
[2] THE PRACTITIONER, October, 1905, p. 489.
[3] *Loc. cit.*
[4] *Trans. Epidem. Soc.*, N.S., Vol. XXII. (1902-3), p. 137.

water level, which is no less than 16 or 17 times the December to June average. After the middle of August, there is a tendency to a slight decline, so that, by the end of August, the deaths from diarrhœa average about 160 a week. Thereafter the fall continues, declining to 100 deaths per week by the middle of September, and to 50 deaths per week by the beginning of October. The decline in the diarrhœa curve is less abrupt than the rise, the low level of about 12 deaths a week not being finally reached until the end of November. In other words, the wave of epidemic mortality takes about 6 or 7 weeks to reach its height, remains at this great height for about 3 weeks, and then takes rather more than 12 weeks to decline to the original level. I suggested[1] in 1903 that this rise and fall in the diarrhœa curve corresponded closely with the contemporary rapid multiplication and then the more gradual diminution in numbers, noticeable in the life-history of the common house-fly (*Musca domestica*). This insect is not seen in appreciable numbers until June, when multiplication proceeds apace until, in July and August (of most years), the fly is in many districts an unmitigated pest. The fly is easily observed to be voracious, and not at all particular as to its diet, so long as there is organic matter to be eaten. It divides its attentions, in almost an impartial manner, between any filth collections in the street, or dust-bin, or privy, or adjoining refuse heaps; and the milk, sugar, jam, bread, or meat on the table. Its appetite is remarkable during July and the first half of August, but after that date it divides its attention to a noticeable extent between eating and mating, with a tendency more and more to the sexual habit. The female fly at the end of August becomes big with eggs, and thenceforth she has the important duty of preserving the species, by depositing her eggs in some appropriate collection of organic matter, which will provide suitable nutriment for the young larvæ when hatched. Now there are two kinds of collections of organic matter which I have found to be specially favoured by the domestic house-fly for breeding as well as for feeding purposes. These are privy closets, and house-refuse collections, respectively. In such collections I have seen the eggs and larvæ of flies in enormous numbers.

[1] *Loc. cit.*

I shall return to this later. To complete the life-history of the visible house-fly, the first frosty night in September materially reduces its numbers in some cases by actual death, but more generally by interfering with its migratory instincts, driving it to seek shelter in the warmest available positions, whether in the house or the dust-heap. As a result, flies no longer settle alternately on decaying organic matter and food supplies. In the house they tend to emigrate from the cooler larder and parlour to the warmer kitchen, and even here they are found in lessening numbers and with lessening vitality.

Here I may interpolate the remark that continued wet weather during the summer months has a similar effect to cold weather, on the emigrant habits of flies, but rain has not nearly the same insecticide effect as frost.

What between the decreasing temperature, especially at nights, and the natural processes of decay after procreation, and egg laying (providing for the perpetuation of the species), the insect is found in lessening numbers until it has become a comparative rarity by the beginning of December. Throughout the winter and spring, flies may be occasionally seen in warm kitchens, bakehouses, and such like, but hardly ever in an ordinary living room until the next summer comes round. If the weather is mild, a few flies may be noticed even in April, and, if meteorological conditions continue favourable, in gradually increasing numbers in May; but it is not until June, that the fly has become really appreciable to everybody as a contemporary, nor until July, that it has become so numerous as to be a pestilence.

Now to come to a point I have insisted upon on former occasions. Dr. Ballard, of the Local Government Board, years ago showed that the relation between high temperature and diarrhœa mortality is indirect, the maximum mortality not necessarily coinciding with the highest reading of the air thermometer. Ballard thought the 4-foot earth thermometer, a more trustworthy guide, as being both less sensitive and steadier in its record, and formulated his well-known conclusions, which are briefly summarised as follows:—

(*a*) The summer rise of diarrhœal mortality does not commence until the mean temperature recorded by the *4-foot earth thermometer* has reached somewhere *about* 56° F.

(*b*) The maximum diarrhœal mortality is usually in the week in which the temperature recorded by the 4-foot earth thermometer reaches its mean weekly maximum.

(*c*) The decline of diarrhœal mortality coincides with the decline of the 4-foot earth thermometer (that is more slowly than the air thermometer, or 1-foot thermometer).

(*d*) The influence of temperature is little, if at all, apparent until the temperature of the 4-foot earth thermometer has risen as stated above. In any case such influence is subsidiary.

Dry, warm, calm summers increase the diarrhœal mortality.

On these facts and conclusions Ballard based his provisional hypothesis, which held the field as a working hypothesis until the writer disputed its infallibility before a meeting of Essex Medical Officers of Health at Chelmsford in November 1902, and again in a discussion on the Causation of Epidemic Diarrhœa at a meeting of the Epidemiological Society in January 1903. At the same meeting, other speakers testified to the fallaciousness of Ballard's critical temperature of 56° F. at a depth of 4 feet. This dealt a heavy blow at Ballard's conclusions as accepted facts. One of the main conclusions on which his "provisional hypothesis" was based being thus shattered, it is perhaps hardly surprising that I ventured in a small but vital detail to differ from his "provisional hypothesis." This "provisional hypothesis" held :—

(*a*) That the essential cause of diarrhœa resides ordinarily in the superficial layers of the earth, where it is intimately associated with the life-processes of some micro-organisms not yet isolated.

(*b*) That the vital manifestations of such organisms are dependent, amongst other things, perhaps, principally upon conditions of season, and on the presence of dead organic matter, which is its pabulum.

(*c*) That on occasion, such micro-organism is capable of getting abroad from its primary habitat, the earth, and, having become air-borne, obtains opportunity for fastening on non-living organic material (especially food, whether inside or outside the body), and of using such organic material both as nidus and pabulum in developing various phases in its life-history.

(*d*) That from food, and from organic matter in certain

soils, it can manufacture a virulent chemical poison, which is the material cause of epidemic diarrhœa.

As one re-writes this "provisional hypothesis" of Ballard, one cannot but be filled with admiration of the master mind which conceived it as a logical deduction from observed facts.

But for the adherence of the scientists of the day to the idea that every disease had an absolutely specific micro-organism as its causal agent, Dr. Ballard would, I think, have modified his hypothesis on the one fundamental point, on which I have ventured to differ from him.

In the above-quoted "provisional hypothesis," if the one word "micro-organism" is deleted, and the plain, unmodified word "organism" substituted, as I suggested three years ago, the "hypothesis" stands, with one or two minor alterations, as good to-day as when Ballard first formulated it.

The truth of the matter is, there is no one specific organism of diarrhœa. Diarrhœa is but a symptom, and may be caused by numerous bacteria. I need only instance the typhoid bacillus, Gärtner's bacillus, Pfeiffer's bacillus, Shiga's bacillus, &c., as diarrhœa-causing bacteria.

Having, then, disabused our minds of the necessity of a specific micro-organism for epidemic diarrhœa, we substitute the word "organism" for micro-organism. I contend that, in the common house-fly, which acts as a carrier of many diarrhœa-causing bacteria from organic refuse, and from the excreta of men and animals, we find the organism.

Recognising the house-fly as the organism, how applicable still in every respect is Ballard's masterly hypothesis. The house-fly, as the "carrier," is the essential cause of epidemic diarrhœa, and resides ordinarily (in the form of egg and larva and newly-hatched insect) either in the superficial layers of the earth (or in some deposit of organic matter upon the earth), where it is intimately associated with many putrefactive, and other bacteria, capable of causing diarrhœa. Its vital manifestations are dependent upon conditions of season, and on the presence of dead organic matter, which is its pabulum. On occasion (in its natural life-history), it is capable of getting abroad from its primary habitat, and having become air-borne (on its wings), obtains opportunity for

fastening on organic material (especially food outside the body, depositing in such food germs which still continue their action *inside* the body).

Some forms of organic material it uses as nidus, and other forms as pabulum, in developing various phases in its life-history. From food (by means of the various bacteria borne on its body) it can manufacture chemical poisons, which are the material cause of epidemic diarrhœa.[1]

Having then recognised the principal agent in the spread of epidemic diarrhœa, if my hypothesis is true that the house-fly (and in a lesser degree the bluebottle-fly) *is* the organism, which Ballard's "provisional hypothesis" (slightly altered) appears to indicate it is, the means of prevention of *really* epidemic diarrhœa is obvious and not difficult.

And perhaps this is the most appropriate place at which to return to the pertinent philosophical questions put (and as yet unanswered) at the beginning of this paper.

The first problem which presented itself was: Why is it that fatal epidemic, or summer, diarrhœa is essentially a disease of infancy? I fear that the exigencies of time and space will not permit me to thrash out each question at all points, and I must therefore put my reasons rather compendiously.

(1) Because milk (fresh or condensed) is the almost sole food of the majority of infants.

(2) Because flies are greatly attracted by milk, whether fresh or condensed, bearing on their bodies and limbs various putrefactive bacteria.

(3) Because the action of such bacteria, so introduced (particularly in hot weather when germ life is very active), is to create the virulent chemical changes in milk, which are the essential cause of diarrhœa.

At this point a critic will naturally say, "But this does not account for epidemic diarrhœa occurring in breast-fed children."

To this I reply I am not at all convinced that wholly

[1] In any particular locality, in any particular epidemic, probably one particular variety of saprophytic organism tends to acquire more and more pathogenic properties, and thus to become specialised for that particular outbreak; but even so, it, in my opinion, depends chiefly upon the house-fly for its conveyance from the fæcal dejecta of ne host to the food of its next victim.

breast-fed infants are really liable to epidemic diarrhœa. My own inquiries in 1904 into the deaths of 138 infants, under one year of age, revealed that—

110 of these infants were wholly, or partly, artificially-fed.

28 were wholly breast-fed.

Analysing these further, I need only say here that not a single death from diarrhœa occurred amongst the wholly breast-fed infants, as against 68 deaths from diarrhœa amongst the 110 artificially-fed infants.

These figures are corroborated by my inquiries for 1905. Not a single death from diarrhœa occurred amongst 20 deaths recorded of breast-fed infants, as against 20 deaths from diarrhœa among 51 deaths inquired into recorded of artificially-fed infants during 1905.

Let us assume, however, that breast-fed infants do occasionally die of epidemic diarrhœa.

In a contribution made to the *Lancet* in 1904, the writer pointed out[1] some possible sources of danger, by means of which even wholly breast-fed children might run a risk of contracting epidemic diarrhœa, through want of cleanliness on the part of the mother, through the abominations known as "dummy teats," through infants being allowed to crawl about the germ-laden floors of common living rooms, and perhaps directly through germ-laden flies settling on their mouths at intervals.

Granting, then, that wholly breast-fed infants do occasionally contract diarrhœa, one point is perfectly clear, not only from the figures I have quoted, but from those published for numerous districts all over the country, viz., that the incidence of fatal diarrhœa among wholly breast-fed infants is a negligible quantity as compared with the diarrhœa death rate among artificially-fed infants.

Older children have a smaller proportion of milk and a greater proportion of other foods, as each month elapses after the termination of the first year of life. Diarrhœa-causing germs cannot multiply, nor produce chemical toxins in other kinds of food to anything like the same extent, as is possible for them to do in milk.

The above are some of the principal reasons why epidemic

[1] *The Lancet*, 1904, Vol II., p. 1043.

diarrhœa is principally and essentially a disease of young infants.

The next problem requiring an answer was, Why is fatal epidemic diarrhœa generally speaking more prevalent in the great Midland and North Western industrial centres than in London?

Here, again, I must refrain from attempting to discuss this question fully, and simply content myself with what is to my mind the most cogent reason. These great cities, such as Liverpool, Manchester, and Birmingham, to a very large extent have conservancy systems in the shape of privies,[1] &c. I can personally testify to the fact that these privies are haunted by flies and their larvæ. In short, those privies provide both nidus and pabulum for flies, their eggs, and their larvæ, as well as for countless billions of putrefactive and pathogenic bacteria. These privies are situated within short distances of rows of houses, and is it any wonder that, in spite of a heavier rainfall than that of London, they suffer in greater proportion than a wholly watercloset city?

The third question dealt with the unequal diarrhœa death-rates in the various sanitary areas in London. Here, again, I believe it will be found that the more affected districts have the larger accumulations of offensive organic matter, such as rag and bone stores, soap works, and other offensive trades and manufactures, acting as breeding places for flies and putrefactive germs, which in due season are to be found in greater numbers than in the more favoured districts, and giving rise to a greater incidence of epidemic diarrhœa.

The fourth question, imperatively demanding an explanation, was, why is it that the infantile mortality of the country, as a whole, has been stationary for many years past, while there has been a coincident marked decline in the general death rate of the community?

Dr. Tatham's table partly answers this, for it shows clearly that infants have benefited along with the general community from a decrease of deaths due to certain forms of disease. Against this, however, is a marked increase of deaths from diarrhœal diseases, which counterbalances what would other-

[1] These privies in the northern cities are gradually being converted into terclosets, and a few years hence I anticipate a considerable reduction in the diarrhœa mortality of these great towns.

wise have been gained. I think that the chief reason why there has been an increase in diarrhœa deaths, and, therefore, why the infantile mortality has not declined *pro rata* with the death rate of the community, is to be found in the fact that fewer infants are breast-fed than formerly ; or, although they may be breast-fed for a time, they are earlier placed on artificial substitutes for human food than used to be the case. These substitutes (particularly cows' and condensed milk and sugar) are specially flavoured by flies.

My own experience is (and it is borne out by the observations of others) that condensed milk is the article of diet, in cases of deaths from epidemic diarrhœa, quite as often as cows' milk.

Whether cows' milk, or condensed milk, was the principal food, there was almost invariably evidence of numerous flies, and the deaths occurred chiefly in proximity to collections of organic matter, such as refuse heaps in brickfields, or rag and bone stores, or manure heaps. In view of this experience, the writer cannot logically agree with Dr. G. F. Still [1] that "in dirty crowded tenements, with little possibility of proper storage, and of less intelligent care," condensed milk is preferable to cows' milk . . . "during the few weeks of hottest summer when diarrhœa is most prevalent," unless the following provisos are satisfied :—(i.) that the contents of the tin are used up directly, or (ii.) that flies are not numerous in the house, or (iii.) that if the flies are numerous, the condensed milk is properly protected from them.

Causes of infantile mortality, other than epidemic diarrhœa, which are in operation all the year round, are dirty milk supplies (as regards collection and transit), overcrowding, want of ventilation, maternal neglect, or maternal occupations, improper methods of feeding, parental vices, &c., but the chief reason of infantile mortality is the hot season, the diarrhœa season, *the Fly Season.*

Our efforts, therefore, should be principally directed toward such sanitary reforms as will prevent the accumulation of organic refuse of any kind, which will act as nidus and pabulum for the house-fly.

If this is impracticable, we should endeavour either to

[1] The Practitioner, October, 1905, p. 468.

destroy the house-fly, or to cover over milk, condensed milk, sugar, and other articles of diet used for young infants, so that flies cannot settle on such food.

Let us inculcate habits of cleanliness, particularly in the house and in relation to all bottles, vessels, &c. used in the preparation of infants' food, and unhesitatingly condemn long-tube bottles. Most important of all, let us forbid, or discourage, the weaning of infants during the fly season, from June to the beginning of October.

I do not propose in the present paper to deal with legislative, or municipal, sanitary administration towards the prevention of summer diarrhœa, whether in the way of watering and scavenging of the streets, paving back passages in towns, improving the quality of our milk supplies, or of the prevention of imposture in connection with so-called "foods" for infants, &c., but will just mention here that I strongly advocate legislation in connection with poultry runs in small back yards in towns.

I have not dealt with many causes of diarrhœa, for I have considered that the part played by *Musca domestica* in the spread of epidemic diarrhœa is so important as to deserve the fullest treatment in this paper.

If these views commend themselves to my medical confrères, and lead to measures which will abate in any degree the present terrific mortality among helpless infants during the fly season, I shall feel amply rewarded.

BRITISH HEALTH RESORTS.

II.—BUXTON.

By CHARLES W. BUCKLEY, M.D. (Lond.),
Buxton.

[With Plates XII.—XV.]

The fame of Buxton as a health resort dates back to the time of the Roman occupation of Britain, as shown by the discovery, in 1698, of a lead cistern of Roman make, and, in 1709, of an ancient Roman brick wall, as well as of other Roman remains at various later dates. The first medical work upon its waters was published by a Dr. Jones, in 1572, at which time the repute of the waters was so great that, despite the difficulties of travelling, the accommodation obtainable was unequal to the demands made upon it. Mary, Queen of Scots, visited Buxton four times, between 1570 and 1583, while two of the greatest men of the time, viz., the Earl of Leicester and Lord Burleigh, also sought relief from their ailments in its waters and climate. Among the earliest historical records of the place is a letter from an emissary of Thomas Cromwell, Henry VIII.'s minister, who had been directed to remove the image of St. Anne of Buckstone, and to seal the baths and wells there on the ground of the superstitious doctrine that their efficacy was due to the intervention of the saint. He also removed the crutches which were hung in the chapel of St. Anne, being offerings from those who had benefited by the waters.[1] The history of Buxton has thus been one of steady progress and advance in popularity, the use of its waters, at first based upon pure empiricism, has increased with the progress of medical science which has placed the therapeutics of mineral waters upon a firm basis.

The springs are eight or nine in number, all rising within a radius of eight yards, the principal being under the floor of the men's large swimming bath. This floor is composed of blocks of marble loosely laid over the springs, so that the water enters the bath through holes in these slabs, and through the interstices between them, large bubbles of gas frequently risin

from the same place, the water being saturated with the gases. Another physical feature, well demonstrated in the larger baths, is the peculiar and beautiful blue tint of the water. The temperature of the water, which is strikingly clear and not unpleasant to the taste, is 82° Fahrenheit. It has been frequently analysed, and, allowing for the variations due to improved methods of analysis, the results are practically identical. The most recent analysis is by Dr. Thresh and is here appended:—

Calcium Bicarbonate	14·10 grains per gallon.
Magnesium „	6·02 „ „ „
Iron „	0·03 „ „ „
Manganese „	0·03 „ „ „
Barium Sulphate	0·05 „ „ „
Calcium „	0·26 „ „ „
Potassium „	0·62 „ „ „
Sodium „	0·84 „ „ „
Sodium Nitrate	0·03 „ „ „
Sodium Chloride	3·10 „ „ „
Magnesium „	0·95 „ „ „
Calcium „	0·02 „ „ „
Ammonium „	trace.
Silicic Acid	0·95 grains per gallon
Organic Matter	0·02 „ „ „
Lithium	trace.
Strontium	„
Lead	„
Phosphoric Acid	„
	27·32 grains per gallon.

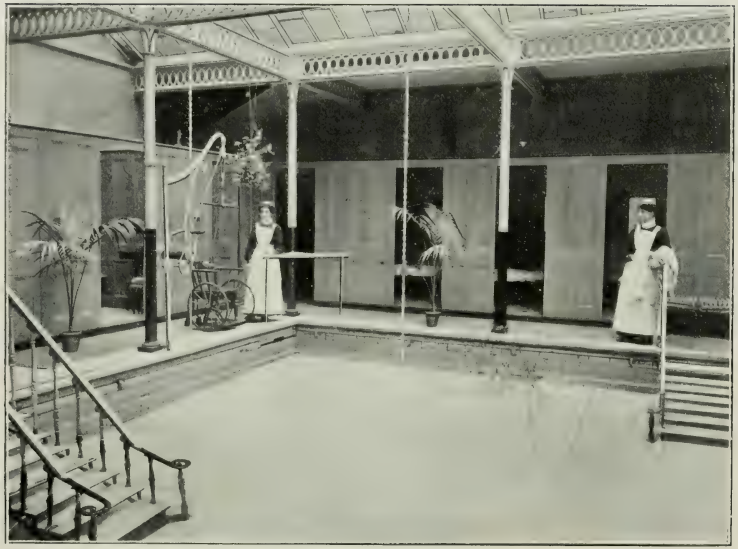
Gases.

Nitrogen	6·1 cubic inches per gallon.
Carbon Dioxide	4·1 „ „ „ „
	10·2 cubic inches per gallon.

This amount of gas would require for its solution, at the temperature of the water, a pressure of 1·64 atmospheres, and, in respect of the quantity of nitrogen present, the Buxton water is pre-eminent, its nearest rival being that of Wildbad.

St. Anne's Well : The Pump Room.

PLATE XIII.



The Natural Water Swimming Bath (for Ladies).

In the mud deposited around the mouth of the springs were also found traces of cobalt and molybdenum, the latter element having never been found previously in any mineral spring.

To this analysis must be added the more recent discovery of Argon and Helium in the gases, and still more recently, Radium has been detected by Lord Blythswood in practically the same quantity as at Bath.

The water, when taken internally, is rapidly absorbed, and, in the majority of cases, is easy of digestion; it acts as a powerful diuretic, besides having an action on metabolism, which for want of a better term must be called alterative, but there is reason to hope that the researches on the metabolism of gout, which are being so widely made at the present time, may reveal more clearly the mode of action of this remedy, as well of others of similar character, which have an action upon this and kindred disorders.

The first action of the water, when used externally, is to produce a momentary shock decidedly greater than that produced by ordinary water at the same temperature, the reaction is marked and a pleasant glow is experienced, with an increase of muscular tone, and of the tone and function of the skin. Free diuresis with an increased output of uric acid occurs, nervous and muscular irritability are calmed, and absorption of exudation is promoted. If the bath has been unduly protracted, or taken under unsuitable conditions, restlessness, stiffness of the muscles, insomnia, palpitation and faintness may follow, and sometimes even more unpleasant symptoms have been recorded. The minimum period required for effective treatment is three weeks; in more severe or chronic cases a much longer time may be required.

The methods of application of the waters are numerous, but may be divided into two groups, (*a*) those in which the water is used at the natural temperature (82°), and (*b*) those in which it is raised to a somewhat higher temperature.

The first group are termed the natural baths, and comprise swimming, private immersion baths, douches for general and local application with, or without, immersion in the water, and atomisers for the application of the water, in a finely divided condition, to the mucous membranes of the respiratory tract. They are situated in a separate building placed over the source

of the principal springs, and are termed natural baths, not simply because they are used at the natural temperature, but because, in the case of the immersion baths, the water is continually flowing through them, and the patient is thus immersed in a stream of running water, as in the more primitive forms where the patients bathe in a pool or lake at the source of the spring. Baths of this type receive the name of "Wildbad," to which our nearest English expression is "natural bath," and form a group of mineral springs of which Wildbad and Gastein on the Continent furnish other examples. These natural baths possess in the highest degree the medicinal properties of the water, but are suited only to the more robust patients, or to those who have undergone a preliminary course of the milder hot baths.

In the hot baths, the water at its natural temperature is mixed with a sufficient quantity, which has been heated by means of a steam coil to a higher temperature, but the process of heating drives off some of the gases, and in this and probably other ways reduces the therapeutic value of the water, producing a bath milder in its effect, and requiring different methods of administration. These baths comprise :— (1) private immersion baths which are fitted with powerful hydraulic douches for intensifying the local effects and with steam douches ; (2) local and general vapour baths for use in combination with, or distinct from, the immersion baths as may be indicated ; (3) the Buxton douche massage bath, and the Vichy douche massage bath in which the patient is massaged under a constant stream of water, there being slight differences of technique in the two cases ; (4) the Aix douche similar in application but without immersion ; (5) the alternating douche, or "douche écossaise" ; (6) the Plombières treatment for mucous colitis and kindred conditions ;[2] (7) local sprays of the atomised mineral water for application to the throat and other parts, on the system in use at Mont Dore ; (8) Needle and shower baths with ascending, descending and wave douches ; (9) Sitz baths in still or running water with, or without, ascending or wave douches ; (10) Mud packs for the local treatment of inflamed joints and other structures, the mud is made by the admixture of a volcanic mud or "fango," obtained from the springs of Montegrotto near

Padua, with the Buxton mineral water, its application being as a rule, followed by douching.

Besides these various methods of applying the mineral water, there is a complete and up-to-date installation of the following methods of treatment :—Hydro-electric baths, local and general ; the electric light bath, Dowsing radiant heat treatment ; high frequency and static electricity ; and Nauheim treatment for heart disease. Massage and electro-vibratory massage are also obtainable.

There is also a Chalybeate spring of the following composition :—

Ferrous Carbonate	3·36 grains per gallon.
Alum. Sulphate	3·95 „ „ „
Calcium Sulphate	9·11 „ „ „
Magnesium Sulphate	4·90 „ „ „
Magnesium Carbonate	0·14 „ „ „
Potassium Chloride } Sodium Chloride }	5·80 „ „ „
Potassium Sulphate	traces.
Manganese	„
Silica	1·22 grains per gallon.

(R. Wright.)

This water is chiefly used for internal administration, but has also a considerable reputation for its local effects in certain diseases of the eye.

Last, but not least, of the therapeutic advantages which Buxton possesses, is the climate, for the effect of which alone a great and rapidly increasing number of patients come yearly, while its effect, as an adjuvant to the mineral-water treatment, in many cases can hardly be over-estimated. It is a matter of question, if meteorological observations are capable of supplying much information as to the character and effect of climate upon the human organism, but, in the absence of any other recognised method of expressing such characters, the following data must be substituted. Meteorological observations have been taken since the year 1868, and the figures may, therefore, be regarded as giving a trustworthy average.

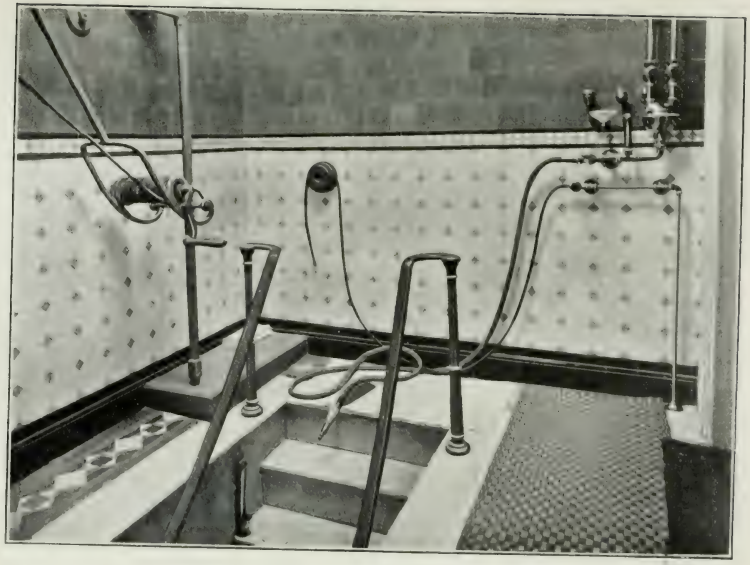
The rainfall averages 49·3 inches.

—	Mean Temperature.	Absolute Humidity.	Relative Humidity.
Summer - -	52·6	3·74 grains of aqueous vapour per cubic foot.	79·2
Winter - -	37·9	2·39 ,, ,, ,,	86·0

The air is dry and bracing, and, owing to the altitude—the barometric pressure being 1 to 1¼ inches less than the ordinary pressure at the sea level—feels peculiarly exhilarating, light and rarefied, and consequently the circulation is freer and more vigorous, and the tissue change and elimination more active and rapid. The rainfall is above the average, as the surrounding hills are among the first to receive the sea and ocean clouds from the west, but, although it seems at first sight to be excessive, yet owing to the hilly character of the district and the great increase of superficial area which results therefrom, surface drainage is very rapid, and the limestone rock, which comes very close to the surface, and upon which the greater part of the town is built, being practically non-absorbent, all the drawbacks of a damp subsoil are done away with, so much so indeed that subsoil water is non-existent. The heavy rainfall, as a matter of fact, is one of the most important and beneficial factors of the climate, the air being washed free from bacterial and other impurities; while experimentally it has been proved that bacterial and putrefactive processes are retarded.[3] It should also be noted that, owing to altitude, conformation, and drainage, the air is the driest of any watering place in the United Kingdom, as will be seen by comparison of the absolute humidity given above. No station of the Royal Meteorological Society can show a lower record.[4]

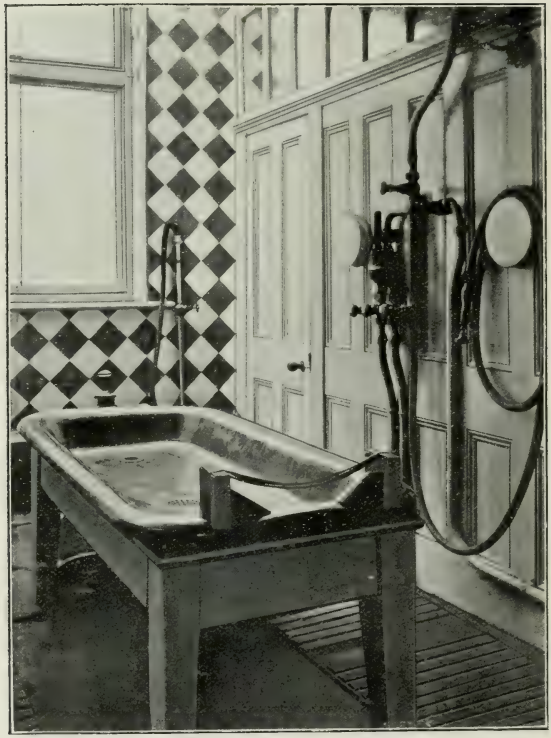
The town is situated in a broad valley in the Peak district, at a height above the sea level of from 1,000 to 1,150 feet, and is surrounded on all sides by hills and moorland rising to a height of from 1,500 to 1,800 feet. The valley is about 3 miles long and 1 mile broad at its lowest part, and is well protected from the north and east, so that winds from these points have not those unpleasant characteristics for which they are noted; the long axis of the valley stretches roughly

PLATE XIV.



Immersion Bath, showing Douches, and Crane for lowering Crippled Patients into the Water.

PLATE XV.



The "Buxton" Douche Massage Bath.

from north-west to south-east, and it is from the former or these points that most of the wind comes, thus the stagnation of air, which is often a drawback to valley stations, is prevented. The magnificent character of the scenery is too well known to require more than a passing reference.

The water supply is pure, soft and plentiful, being obtained from the adjacent millstone grit formation, and not from the limestone upon which most of the town is built. The drainage system is efficient, and on the most up-to-date principles. The mortality is only 9·5 per 1,000 (20 years' average), which testifies eloquently to the healthiness of the climate.

Season.—The most popular season for visiting Buxton is from June to September, but probably the pleasantest part of the year is from April to June, when the overcrowding, inevitable in a fashionable health resort at a later period of the year, is absent. Visitors in increasing numbers now come during the winter months, and the results of treatment by baths, &c., at this season are, in the majority of cases, as good as at the more popular season, while the beneficial effect of the climate is even more noticeable, although it may not always appear so pleasant, and the popular winter sports, tobogganing, sleighing, curling, &c., give a zest, which in itself is of considerable advantage in many cases.

Therapeutic Indications.—The fame of Buxton, from the earliest times, has been based on the curative efficacy of its waters in rheumatism, gout, and kindred disorders, and its reputation in this direction is probably greater than ever, and second to no other spa.

Internally, the use of the water has a powerful eliminant effect in many toxæmic states, the quantity of uric acid excreted is markedly increased, and any tendency to urinary deposits of oxalate of lime or uric acid crystals is removed. The external use of the water alone also increases the elimination of uric acid. The swimming and immersion baths are used for their general constitutional effects in rheumatic and gouty states, and, when combined with douching, exert a powerful effect upon local effusions and exudates in or around the joints, muscles, or other structures, relieving stiffness and pain rapidly and effectually. The more chronic forms of arthritis and myalgia benefit greatly from the use

of the Buxton douche massage bath, a form of treatment which is rapidly increasing in popularity, thereby rendering a considerable increase in the accommodation necessary. In rheumatism, and especially in rheumatoid arthritis, the peculiar dryness of the air is of special value, and the absence of subsoil water is of great importance, as shown by the extreme rarity of such diseases among the residents. There is, probably, no climate in England better suited to chronic sufferers from these diseases, the low temperature having, in the absence of damp, no prejudicial effect, while, by its stimulating influence, the resistance of the patient is materially increased. The "fango," or mud treatment, is of especial value in rheumatoid arthritis and in gonorrhœal rheumatism, relieving pain and promoting absorption in a remarkable way, while it can be used with advantage in those acute stages in which most forms of bath treatment are contra-indicated.

Nervous Diseases.—Sciatica, brachial neuritis and neuralgias of various kinds are treated with good results, while such functional conditions, as neurasthenia, are benefited by the climate and suitable hydrotherapeutic procedures.

Diseases of the Skin, especially when associated with a gouty or rheumatic diathesis, are benefited both by external and internal treatment.

Anæmic Conditions and Convalescence from acute or prolonged disease are favourably influenced by the climate and the use of the chalybeate water.

Diseases of the Heart.—The Nauheim baths and exercises prove very helpful in many cases of heart disease, and their effect is often materially increased by the effects of the climate, though, for some cases, it is found to be too stimulating.

Tropical Diseases.—Buxton is rapidly acquiring a considerable reputation for the treatment of tropical and subtropical diseases, especially malaria and disorders of the liver. Here, again, the climate may claim a large share of the credit, though vapour, mineral, and other baths materially assist.

There is a close resemblance between the waters of Buxton and those of Plombières, and the reputation which the latter spa has gained in the treatment of muco-membranous colitis and similar disorders has led to the installation of a

complete range of douches, &c., as used at Plombières, so that there is now no need for patients to undergo the fatigues and drawbacks incidental to visiting a foreign spa for the treatment of this disease.

Chronic catarrhal conditions of the nasal, pharyngeal, and bronchial mucous membranes obtain much benefit from the use of sprays of the finely divided mineral water, on the plan which is in use at Mont Dore, while the constitutional conditions commonly associated with them are benefited by drinking the water and by the use of the mineral baths.

Phthisis.—Owing to the purity of the atmosphere, the town is specially suitable for early cases of phthisis, and is probably the nearest approach in Great Britain to the well-known resorts of the Engadine.

Diet.—The leading hotels have adopted a system, under the direction of the Buxton Medical Society, of marking on the bill of fare those articles of food specially suitable for patients taking the waters, thus approximating to the custom of some of the leading continental spas. There are also institutions in which dietetic cures of the most specialised character can be carried out.

Contra-indications.—Cases of advanced heart or kidney disease, or those in which there is any marked tendency to apoplexy, should not be sent to Buxton. Besides these cases, there are patients who do not seem suited by the climate; but, as a rule, these cannot be determined beforehand.

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FAMOUS HOSPITALS AND MEDICAL SCHOOLS.

SOME GREAT MEN OF GUY'S.

I.

EARLY PHYSICIANS.

[With Plates XVI.—XVII.]

THE first physician to Guy's Hospital was James Jurin, a Doctor of Medicine of the University of Cambridge, a Fellow of the Royal Society, a distinguished mathematician and physicist, and one of the foremost physicians of his day. His reputation extended beyond the shores of his native island, for Voltaire speaks of him in the *Journal des Scavans* as the "famous Jurin." He was one of the early advocates of inoculation for small-pox. He held office from the opening of the hospital in 1725 till 1732, when the increasing pressure of private practice led to his resignation. Jurin's most interesting contribution to practical medicine was his *Account of the effects of Soap Lye taken internally for the Stone*, which was published in 1742. He was himself a sufferer from gravel, and in 1740 passed a stone of the size of a pea. He continued to suffer grievously, but resolutely declined to take the quack remedy for the disclosure of which Mrs. Stevens had received a grant of £5,000 from Parliament the year before. After reading the *Experiments and Observations* of Stephen Hales on the solvent effect exercised on calculi by soap lees, which contain lime and potash in abundance, Jurin tried the remedy on himself. After some months his condition improved, and he passed a number of small stones, which showed signs of the solvent power of the lime. He used the remedy in a form which he called "Lixivium Lithontripticum;" "for the public benefit," however, he concealed the mode of preparation. Jurin was elected President of the College of Physicians, January 19, 1750, but enjoyed that dignity only two months, as he died on the 29th of the following March in his 66th year.

Of the other early physicians to Guy's there is little to

say. It may readily be believed that they passed by doing good, but they left no mark. The first one of real eminence who became attached to Guy's after Jurin was William Saunders, a pupil of Cullen, who took his M.D. degree at Edinburgh in 1765. His knowledge of chemistry commended him to the notice of Sir George Baker, whom he assisted in his memorable researches on Devonshire colic. In 1770 he was elected physician to Guy's, where he may be said to have introduced a new era, for he began to lecture on the theory and practice of medicine. He was a copious author and a very successful physician. He was one of the founders and the first President of the Royal Medical and Chirurgical Society. Astley Cooper says of him: "He was a most entertaining lecturer, but a superficial person with a considerable share of genius. He would give out that he should lecture next day on Absorption, and ask someone to get him Cruickshank that he might not come down entirely ignorant." This seems to show that Saunders had at least qualities which are not perhaps too common among eminent physicians, to wit, frankness and a sense of humour.

EARLY SURGEONS.

Of the early surgeons of Guy's very little is known, a fact which need not surprise us when it is remembered that in the early part of the eighteenth century surgeons were still looked upon as mere handicraftsmen. The first in the long list of distinguished surgeons who have played the part of *servi servorum Dei* in Guy's is Samuel Sharp, a pupil of Cheselden, who was elected in 1733. He was a man who saw things with his own eyes, and thought for himself. As a French writer said, long after his death: "There are few diseases on which he did not put forward new ideas, few operations whose instruments or procedure he did not improve. His writings contain many things in a few pages, and we find in them both an originality and an independence of thought which charm the reader and always secure his attention." Sharp in early life had studied for a long time in Paris, where he made the acquaintance of Voltaire. At a later period he travelled in Italy and published his observations and experiences in *Letters from Italy*, which appeared in 1766.

These letters, while full of descriptions of the dirt and other unpleasantnesses of Italy, throw a curious sidelight on the condition of London Hospitals of that day. In a hospital at Florence, Sharp saw an iron framed bedstead made to exclude bugs, and he says that attempts to make similar bedsteads in England had failed. He adds that "in the hospitals at London, bugs are frequently a greater evil to the patient than the malady for which he seeks a hospital, and could I have interest enough with the governors to bring about an imitation of this frame, I should be exceedingly rejoiced, in the comfort it will afford to so many thousands of miserable wretches, that are tormented, sometimes even to death, by these nauseous vermin." This, says Sir Samuel Wilks (on whose *Biographical History of Guy's Hospital* written in conjunction with the late E. T. Bettany, this article is founded), seems to confirm a story, supposed to be exaggerated, which Sir William Gull was in the habit of relating, to the effect that when Mr. Harrison was appointed treasurer to the hospital, £40 a year was paid to a "bug-catcher."

Another notable figure was William Cooper, who was surgeon to Guy's from 1783 to 1800. He was not looked upon as a first-rate operator, but there were very few surgeons of his day who possessed a better knowledge of the art. He is now chiefly remembered as the uncle of Astley Cooper, who became his articled pupil in 1784.

THE MAKERS OF THE SCHOOL.

In an early stage of its existence Guy's was for teaching purposes united with St. Thomas's. Lectures on anatomy with references to its surgical applications were given by Samuel Sharp, and afterwards by Cline, to mention only those whose names are not altogether forgotten. Lowder lectured on midwifery, Babington on chemistry, and Saunders on the practice of physic. Each surgeon had a certain number of apprentices and dressers who picked up such crumbs of knowledge as fell from his master in going through the wards. But the foundations of Guy's as a separate school were laid by Benjamin Harrison, who held the office of Treasurer from 1797 to 1848. He ruled both the hospital and the school with a rod of iron, but on the whole he seems to have been

a benevolent despot of the type glorified by Carlyle. He did much for the school in a material sense, but it is to Astley Cooper that Guy's owes its first rise into scientific fame.

SIR ASTLEY COOPER.

This great man was the grandson of a Norwich surgeon and the son of a Norfolk parson. He was born in 1768, and his boyhood was, like John Hunter's, free from the bondage of a systematic education. A casual visit to the Norwich Hospital where he witnessed a surgical operation determined his future career. In 1784 he was articled to his uncle, but he soon transferred himself to Cline, one of Hunter's most enthusiastic pupils. Young Cooper spent a winter at Edinburgh, and on his return to London he attended the lectures of John Hunter. From the first his path was made easy for him by patronage and by fortune; these aids, however, would have availed him nothing had he not had the ability to put his advantages to profitable use. But he never felt the truth of Johnson's bitter line: "Slow rises worth by poverty deprest." In 1789 he was appointed demonstrator of anatomy at St. Thomas's, and two years later he became joint lecturer with Cline in anatomy and surgery. In 1791 he married a "lass wi' a tocher" of £14,000, which placed him above the reach of sordid cares and left him free to strive for the highest position in his profession. His lectures on surgery at first failed to attract large audiences, but when he began to illustrate them with cases students flocked to hear him, and he ultimately had a class of four hundred.

In 1780 Astley Cooper was appointed surgeon to Guy's. He was a handsome man, of cheerful temper and excellent digestion, who led a simple life and was so absorbed in his work that he had little or no interest to spare for anything outside his profession. He shed the influence of his genius on all, colleagues, students and patients, who came within its sphere of action. At the height of his fame the mere fact of having been his dresser made smooth the way to practice in any part of the country.

Dr. Pettigrew in his *Medical Portrait Gallery* thus describes Cooper's influence over his pupils: "I can never forget the enthusiasm with which he entered upon the performance of

any duty calculated to abridge human suffering. This enthusiasm by the generosity of his character, his familiar manner, and the excellence of his temper, he imparted to all around him, and the extent of the obligations of the present and of after-ages to Sir Astley Cooper in thus forming able and spirited surgeons can never be accurately estimated. He was the idol of the Borough School. The pupils followed him in troops; and like to Linnæus, who has been described as proceeding upon his botanical excursions accompanied by hundreds of students, so may Sir Astley be depicted traversing the wards of the hospital with an equal number of students listening with almost breathless anxiety to catch the observations which fell from his lips. But on the days of operations this feeling was wound up to the highest pitch. The sight was altogether deeply interesting; the large theatre of Guy's crowded to the ceiling, the profound silence obtained upon his entry, that person so manly and so truly imposing, and the awful feeling connected with the occasion, can never be forgotten by any of his pupils. The elegance of his operation, without the slightest affectation, all ease, all kindness to the patients, and equally solicitous that nothing should be hidden from the observation of the pupils, rapid in execution, masterly in manner, no hurry, no disorder, the most trifling minutiæ attended to, the dressings generally applied by his own hand, the light and elegant manner in which Sir Astley Cooper employed his instruments, always astonished me, and I could not refrain from making some remarks upon it to my last master, Mr. Chandler, one of the surgeons to St. Thomas's Hospital. I observed to him that Sir Astley's operations appeared like the graceful efforts of an artist in making a drawing. Mr. Chandler replied: 'Sir, it is of no consequence what instrument Mr. Cooper uses; they are all alike to him, and I verily believe he could operate as easily with an oyster-knife as the best bit of cutlery in Laundy's shop.' There was great truth in this observation. Sir Astley was at that time certainly one of the best operators of the day, and this must be taken in its widest sense, for it is intended to include the planning of the operation, the precision and dexterity in the mode of its performance, and the readiness with which all difficulties were met and overcome."

Cooper's own estimate of his skill as an operator was not so high. What he says of himself is interesting :—"Sir A. Cooper was a good anatomist, but never was a good operator where delicacy was required. He felt too much before he began ever to make a perfect operator. Quickness of perception was his forte, for he saw the nature of disease in an instant, and often gave offence by pouncing at once upon his opinion. The same faculty made his prognosis good. He was a good anatomist of morbid, as well as of natural structure. He had an excellent and useful memory. In imagination he was vivid. His principle in practice was never to suffer any who consulted him to quit him without giving them satisfaction on the nature and proper treatment of their case." Lapsing suddenly into the first person, he adds : "My own success depended upon my zeal and industry, but for this I take no credit, as it was given to me from above." However much he may have felt before he began, he did some marvellous feats of surgery. He tied the abdominal aorta for aneurism, and he is said to have been the first who amputated at the hip-joint.

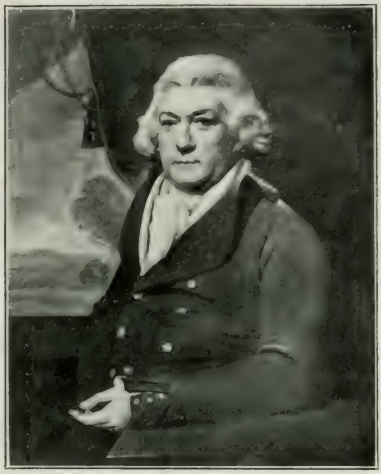
Cooper's whole life was in his work. The account of the manner in which he spent his days, as given by his nephew, Bransby Cooper, is enough to stagger ordinary humanity. Rising at six, he dissected privately till eight, and from half-past eight saw large numbers of patients gratuitously. He made a light and hurried breakfast, glanced at the newspaper, and then went to his consulting-room. During the forenoon his faithful henchman, "Charles," had to put forth all his powers of diplomacy to manage the throng of eager visitors who strove with each other for admission. That not incor ruptible Cerberus is said to have made £600 a year in the discharge of his duties. At one o'clock the great surgeon left for the hospital, sometimes escaping the waiting crowd through his stables into a back street. At Guy's he went through the wards ; at two there was a rush of students across the street to old St. Thomas's, to secure a place in the anatomical theatre. After the lecture Cooper went round the dissecting room. Then he visited patients or operated privately, reaching home at half-past six or seven. In his carriage he dictated to one or other of his assistants. Dinner was quickly dispatched ;

then, after a doze of ten minutes, he would lecture on surgery, and again visit patients till midnight. This was the course of his life from year to year, and in those strenuous days doctors took no regular holiday.

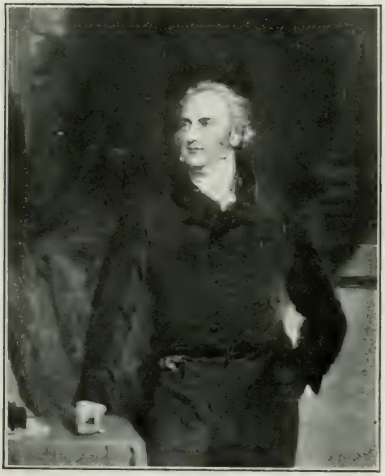
Cooper's professional income was for many years £15,000 a year; the high-water mark of £21,000 was reached only once. He used to say that John Abernethy's rough manners were worth £1,000 a year to him. His fame was European, and surgeons came from foreign countries to see him, as Livy's Spanish admirer travelled to Rome merely to gaze on the great historian in the flesh. Honours were showered upon him. He was twice President of the College of Surgeons. He was made a Baronet by George IV., from whose scalp he removed a small tumour, and he was decorated with the cross of the Legion of Honour by the King of the French.

It is wonderful that he was able to stand the strain of such a life for many years. It was not till the beginning of 1825 that failing health compelled him to reduce the pressure. He resigned his hospital and teaching appointments and bought an estate near Hemel Hempstead, where he spent as much time as he could. The death of his wife in 1827 made him decide to retire from practice, but having no intellectual resources within himself apart from professional work, he soon put himself into harness again. At the beginning of 1841 he died, and was buried under the chapel of the hospital on which he had shed such lustre. His writings: *Hernia; Dislocations and Fractures of the Joints* (1822); *Diseases of the Breast* (1829); *Diseases of the Testis* (1830); and the *Anatomy of the Thymus Gland* (1832)—all the outcome of original work, for he read very little—are classics. The name of Astley Cooper is writ large in the history of the healing art.

Astley Cooper had no rival in surgery; indeed, as far as the fame of Guy's in the outside world was concerned in the early part of the last century, he might have said, without much exaggeration, *L'état, c'est moi.* But as old age made his fire grow pale, other stars rose on the horizon. It was the singular good fortune of Guy's to have at one and the same time on its medical staff, or in the service of its school, three men whose names live in the diseases which their genius



William Saunders.



Sir Astley Cooper.

PLATE XVII.

Richard Bright.

Thomas Addison.

added to nosology—Richard Bright, Thomas Addison, and Thomas Hodgkin.

RICHARD BRIGHT.

Richard Bright was born of a wealthy Bristol family in 1789. In 1808 he went to Edinburgh to study medicine. In 1810, with Dr., afterwards Sir, Henry Holland, he accompanied Sir George Mackenzie to Iceland, and contributed notes on botany and zoology, and other matter, to Mackenzie's *Travels in Iceland*, which was the outcome of the expedition. On his return, Bright took up his abode in the house of a resident officer of Guy's Hospital, where he lived for two years. Returning to Edinburgh, he took his doctor's degree in 1813, afterwards studying in various medical centres on the Continent. He left a record of his journeyings in a book entitled *Travels from Vienna through Lower Hungary*. In 1820 began his official connection with Guy's, within whose walls he for many years spent six hours a day. For a long time he lectured on medicine in conjunction with Addison. In 1827 Bright published the fruits of his clinical observations and pathological researches in a book entitled *Reports of Medical Cases*, which at once made his name famous. That work contains a full account of the morbid conditions of the kidney, with which Bright's name will always be associated. His interest was by no means confined to the kidney, but ranged over the whole field of disease. His writings on diseases of the pancreas and duodenum, on abdominal tumours, and on diseases of the brain are marked by rigorously accurate observation and shrewdness of insight. Bright ranks with those who have enlarged the boundaries of medical science. Dr. Barlow says of him: "There has been no English physician—perhaps it may be said none of any other country—since the time of Harvey who has effected so great a revolution in our habits of thought and methods of investigating morbid phenomena and tracing the ætiology of disease." As a practical physician Bright was of the greatest. By the force of knowledge and character he rose to the highest place in his profession.

Bright died in 1858, not, as has often been stated, of the disease with which his name is identified, but of a damaged heart. He was a man of most amiable character, sincerely

religious, and "of so pure a mind that he never was heard to utter a sentiment or to relate an anecdote that was not fit to be heard by the merest child or the most refined female."

THOMAS ADDISON.

Addison came of Cumbrian stock, and was born in 1793. After receiving his literary education at Newcastle, he studied medicine at Edinburgh, where he graduated in 1815. Coming to London, he studied skin diseases under Bateman, and is said to have been the first physician in London who lectured on those affections. All his life he was interested in dermatology, and it is largely to his direction that Guy's owes its fine collection of wax models. In 1824 he was appointed assistant-physician to Guy's Hospital. In 1829, he published, in conjunction with a surgical colleague, John Morgan, an essay entitled *The Operation of Poisonous Agents on the Living Body*, said by Wilks to be the result of the first serious investigation made in England into the phenomena of general poisoning. In 1837 he became physician, and was appointed joint lecturer with Bright on medicine. They projected a work to be called *The Elements of Practical Medicine*, but only the first volume, which was written by Addison, ever saw the light. Addison also wrote much on the lungs, and taught that "inflammation constitutes the great instrument of destruction in every form of phthisis." His memoir announcing the discovery of the disease with which his name is associated appeared in 1855, but for years he had been making observations on the subject. Addison's views met with considerable opposition, both in this country and abroad, and it was a long time before they were generally accepted. It was the great French clinician, Trousseau, who first proposed that the disease, which Addison himself called "melasma suprarenale," should be called after its discoverer. Wilks says that Addison's writings, on which his fame rests, contributed but little to his reputation in his lifetime. It was his teaching and his force of character that made him the power he was at Guy's. He was more feared than loved. His manner was unsympathetic, often haughty, and sometimes repellent. This, he himself declared, was only a cloak for nervousness, and it is certain that he was capable of acts

of remarkable generosity. He was more interested in finding out the cause of disease than in treating it, and he often forgot to prescribe any medicine. Addison complained that he was misunderstood, and apparently with some reason, for the *Lancet* described him as "a blustering bundle of loquacity." Bright, according to the same authority, was "a heavy, conceited person." These examples of "how it strikes a contemporary" have in them a moral which need not be pressed. Addison died in 1860.

THOMAS HODGKIN.

Hodgkin was born in 1798, and took his degree at Edinburgh in 1823. He afterwards studied abroad, giving special attention to pathology. On his return to England he was appointed curator of the museum and demonstrator of morbid anatomy at Guy's Hospital. He laid the foundation of the museum, and was indefatigable in adding to the collections, and, by his teaching, he played an important share in making Guy's a scientific school of medicine. He described the disease which bears his name in a paper communicated to the Medico-Chirurgical Society, and he was the first to recognise retroversion of the aortic valves and the sounds accompanying that lesion. Hodgkin's independence of mind and liberality of thought made him disliked by the powers that were at Guy's in the thirties, and owing to this, to quote the words of Wilks and Bettany, "Guy's Hospital lost one of its greatest ornaments, and the profession of England one who was destined to shed a lustre on its ranks." Thus diverted from a career which could scarcely have failed to be of the highest benefit to mankind, Hodgkin gave his later years almost entirely to philanthropic efforts. He never had much practice, and cared so little for money that it was difficult to induce him to accept a fee. He died in 1866.

Reviews of Books.

On Professional Education with special reference to Medicine. An address delivered at King's College, London, on October 3, 1905, by T. Clifford Allbutt, M.A., M.D., F.R.S., Hon. D.Sc. (Oxon.), Regius Professor of Physic in the University of Cambridge. London: Macmillan & Co. 2s. net.

Everything that comes from the pen of Professor Allbutt is worthy of careful study and attention, both for the subject matter, and the style in which his thoughts are conveyed. This little book, far from being any exception to this rule, enhances his reputation as a speaker and thinker. The subject is full of interest, and, at the present time, is exceedingly opportune. Education is touched upon from almost every conceivable standpoint, and the conclusions drawn from the discussion are fraught with matter demanding serious consideration. Professor Allbutt, at the outset, very properly draws attention to the difference between education and instruction, and we could almost wish that he had laid even more stress than he does on the need of educating, developing the faculties of, the sons of the classes from which our professional men are drawn. The elementary school teacher is, as a rule, skilled in the theory and practice of education, a quality not always possessed by those whose duty it is to educate and instruct in our secondary or public schools. The Professor's words on this are worth quoting here. In reference to the future of the lad, who seeks to enter a profession, he says:—"If he is to be equal to the conflict of modern life, he must be able to reason both on men and nature, to measure his own capacities, to read the hearts and habits of men, and to foresee the trend of natural laws. For these ends, besides energy and will, he must have a curiosity for knowledge, some intellectual seriousness and flexibility, some endurance of attention, some self-possession, and some ideas; qualities eminently in defect in the average products of our public schools."

It is perhaps a matter worthy of careful consideration, as to whether boys of all classes in this country should not receive their first years of education together, at the hands of skilled teachers, as they do in America, and in many Continental countries.

With regard to the subsequent training of the aspirant for the medical profession, Dr. Allbutt wisely insists upon the paramount value of the University; not an Institution, which is but little better than a superior Technical College, but one wherein the minds become expanded by other kinds of study, such as language and literature, and are thus enabled to bring to the sphere of scientific studies a riper understanding. His concluding remarks on ethical training exalt Professor Allbutt's reputation as a trustworthy guide to the rising generation of medical men, and our advice to all, who have the highest interests of the profession at heart, is, get this address and study it thoroughly.

Abdominal Operations. By B. G. A. Moynihan, M.S., F.R.C.S. 694 pages, fully illustrated. London: W. B. Saunders & Co. 28s. net.

Mr. Moynihan has given us the best text-book on abdominal operations in the English language. It commences with a *résumé* of our knowledge of the bacteriology of the stomach and intestines. Then follows a detailed description of the preparations necessary for all abdominal operations, and of special preparation for each individual operation. The indications for each operation are clearly and concisely stated, and the actual operative procedures are then lucidly and exhaustively described in detail. The after treatment and the results of operations, both in the author's own experience, and in that recorded in recent literature, are fully set forth. The illustrations form one of the distinguishing features of the book. They are all new, having been specially prepared under the author's personal supervision, and are all beautifully executed. Mr. Moynihan has forestalled any comment to be made on the fact that he gives no detailed reference to any mechanical contrivance, button, or bobbin, for intestinal anastomosis, by stating that their purpose has been served, and their interest is now only historical. The only point open to criticism is the title of the work. Its scope is too restricted for its title. We should have expected to find descriptions of operations on the genito-urinary organs, on the pelvic organs, and of the various operations for hernia, in a book bearing the title "Abdominal Operations." None of these, however, are described. We hope, therefore, that Mr. Moynihan will furnish us in due course with another volume, dealing with these subjects, similar to the one before us.

A Treatise on Plague, dealing with the Historical, Epidemiological, Clinical, Therapeutic, and Preventive Aspects of the Disease. By W. J. Simpson, M.D., F.R.C.P., D.P.H., Professor of Hygiene in King's College, London, &c., &c. London: Cambridge University Press. Pp. xxiv and 466.

Professor Simpson has admirably succeeded in writing a *treatise* on plague, and his work, viewed from any standpoint, compares favourably with previous similar attempts. Part I. deals with the history and distribution of plague, and Chapter I., which discusses the history of plague from the earliest times down to the nineteenth century, is of the greatest interest. In the two subsequent chapters the history of plague in India, and of the present pandemic is detailed. In Part II. the epidemiology of plague, the nature of the infection, and bacteriology of the disease, the relationship of epizootics to it, the ætiology of epidemics and pandemics, variations in virulence, in the powers of diffusion, and in seasonal incidence, modes of dissemination, &c. are fully dealt with. In Part III. plague in the individual is discussed, and the morbid anatomy, channels of infection, clinical features, diagnosis, prognosis, and treatment are set forth. In the last Part (IV.), the measures for the prevention and suppression of plague are considered, *e.g.*, quarantine, isolation, disinfection, prevention, inoculation, &c.

It will thus be seen that the whole subject is dealt with, and the author's wide experience of the disease in India, in Hong Kong, and in South Africa has enabled him to introduce a number of practical details in the management of epidemics and the like, which would have been

overlooked by anyone less conversant with the subject. In the last chapter, many suggestions are given on some of the points on which systematic research is needed, and anyone stationed in a plague district may thus, if opportunity is afforded, work out one or more of the problems awaiting solution.

The book is well printed, and a number of illustrations, maps, charts, &c. enhance its value.

Climate and Health in Hot Countries, and the Outlines of Tropical Climatology. By Lieut.-Colonel G. M. Giles, M.B., F.R.C.S., I.M.S. London: John Bale, Sons, and Danielsson, Ltd. Part I., pp. 184; Part II., pp. 109. Price 7s. 6d. net.

This book is written in a popular form and is intended mainly for the non-professional reader. The writer is a well-known authority on tropical diseases, mosquitoes, and kindred subjects, and from a long residence in India can speak authoritatively on these subjects. Domestic architecture in the tropics, clothing, water, and food, the proper method of apportioning the day, and the management of children, are all fully and adequately dealt with. We do not think the author lays sufficient stress upon the sterilisation of ordinary, as well as of obviously dirty, water, by boiling, or by a Pasteur-Chamberland filter, one of which methods should always be adopted, and when he says "a few feet of sand when in good working order rivals the Pasteur porcelain filter," he is promulgating a dangerous doctrine. Alum also has little germicidal power when added to water. Many valuable hints are given on the choice of food and methods of serving it, and some of the author's common-sense remarks on the diet and feeding of children are excellent, and might be consulted with advantage by many a parent and medical man in cooler climes.

Tents and camp sanitation having been briefly dealt with, the author proceeds to the important question of the prevention of malaria; this includes a description of mosquitoes and their habits, a subject which Colonel Giles has made his own, and various methods of mosquito destruction are fully detailed.

The prevention and treatment of the common tropical diseases and ailments are discussed in a simple manner.

The second part of the book deals with the climatology of tropical countries, and contains a valuable collection of meteorological and other data, so that anyone may obtain a good idea of the climatic characteristics of the country in which he is to be stationed. The work should prove of the greatest value to the interested layman, and the student of tropical medicine cannot afford to overlook it.

The Vermiform Appendix and its Diseases. By Howard A. Kelly, A.B., M.D., and E. Hurdon, M.D. Philadelphia, New York, and London: W. B. Saunders & Co. £2 2s.

This magnificent volume contains the most complete account of the subject that has yet appeared in our language, and stands in the front rank of special treatises. Even among American books, it is distinguished by the profusion and excellence of its illustrations. These reproductions from

original drawings reach a high artistic standard, and, by their ingenious composition and subtle gradations of tone, the reader's attention is focussed as on a diagram. Indeed, a careful study of the pictures, which number over 400, gives an excellent *résumé* of the subject.

The text is written with great care, and shows exhaustive consideration with wide experience. The first three chapters are devoted to the history of appendicitis, and the next four to development and normal anatomy. The latter are written by Dr. Brödel, who, assisted by his wife, has supplied many of the illustrations.

To the practitioner, the chief points of interest in the volume centre in the chapters on diagnosis and treatment of appendicitis. In spite of the mass of information presented, the main facts are clearly brought forward, and detail is relegated to a secondary place. As we should expect in an American book, the author emphasises the importance of surgical interference at the earliest stage. The ideal time for operating, he states, is within the first few hours—not later than 24—for then only will the difficulties in separating adhesions, and the danger of setting up diffuse peritonitis in so doing, be reduced to a minimum. Although the majority of medical men in this country are not such enthusiastic advocates of early operation, yet there will be general agreement with the repetition of W. W. Keen's aphorism that "the first duty in appendicitis is to call in a surgeon," upon whom will rest the responsibility of undertaking or of deferring operation. Upon the difficulties in diagnosing, with any approach to certainty, the severity of the lesion in any patient, Dr. Kelly has nothing new to tell us. There is much truth in his observation that "many surgeons, even the best, are guided in their conduct towards any individual case by their personal experience in the immediate past, thus demonstrating their fallibility of judgment."

A chapter is devoted to the subject of appendicitis in childhood, and another to that in typhoid fever. In the latter, the author regards the lesion, rightly we think, as a simple extension of the enteric inflammation, and counsels conservative treatment in the absence of perforation. The latter part of the book is devoted to the consideration of operative measures, which are admirably described, with the necessary exactitude of detail. Complications, with their appropriate treatment, are fully discussed, and constant reference is made to actual cases. An excellent account is given of the rarer diseases of the appendix, with interesting illustrations. In conclusion, we may mention that, throughout the volume, the names of authorities, with references to their original papers, are inserted in the text, and compiled into a special index at the end.

NOTES FROM FOREIGN JOURNALS.

THE INFLUENCE OF SACCHARIN ON DIGESTION.

In the *Journal of the American Medical Association* for September 1905 is an important paper by Mathews and McGuigan, detailing the results of their investigations into the action of saccharin. They find that it exercises a decidedly retarding effect upon the digestive juices, particularly in the case of the salivary and of the pancreatic secretions. When it is introduced into an animal by intravenous injection depression and stupor result, followed later by laboured respirations, very like asphyxia. They attribute these effects to an inhibitory action on the enzymes contained in the blood and the tissues generally, and consider that this action accounts for the headache and other symptoms produced by its use. The tendency of a long continued use of this benzol-compound is certainly to produce digestive troubles. In addition to this it must, like several of its congeners, be regarded as a general protoplasmic poison. General metabolism is decreased owing to the inhibition of most of the fermentative processes of the body.

THE TREATMENT OF ULCERS OF THE LEGS.

Brings recommends a method of treatment by zinc paste, which is especially suitable for use in working-class practice and yields very good results. It is necessary first of all to get the ulcer clean by means of rest in bed for five days and washing it with weak carbolic lotion. Then the foot and leg from the root of the toes up to the popliteal space, and including the edges of the ulcer, are bathed with the zinc paste made fluid by warmth. The paste is prepared by heating 20 grammes of oxide of zinc and 20 grammes of white gelatine in a mixture of 80 grammes of water and 80 grammes of glycerine. The mixture must be well sterilised, as gelatine may contain the bacillus of tetanus and other nocuous bacteria, On the ulcer itself is placed a piece of sterilised gauze as soon as the granulations are healthy. If the ulcer is sluggish, or covered with hypertrophic granulations, it must be first treated by calomel or applications of nitrate of silver. The gauze is applied over the edges of the ulcer and remains fixed in its position. When the layer of paste applied to the skin is dry, the limb is covered with a bandage moistened in warm water, not wetting it too much and making no turns. The bandage is then treated with the warm zinc paste until it is well impregnated. After a few minutes a second bandage is applied in like fashion, which may be covered with a third. At the end of half an hour the dressing is dry and solid, and the patient can go about his work the same day. The first application is left on until the secretion from the ulcer has soaked through all the layers, which usually happens in from three to five days. It is sometimes necessary to give a narcotic at night because the stasis of the secretion during the night and the consequent desiccation of the dressing bring about a compression of the ulcer with pain as a consequence. At the end of a week the bandage is renewed and can be left off in from three to six weeks. It is easily removed by placing the limb in a bath of warm water.

This dressing has the advantage of excluding the "solution of continuity" from the exterior and protecting it against soiling. It is thick but elastic, and

is well fitted to the skin and the contours of the limb. It exerts a gentle pressure upon the superficial vessels and restores their tonicity. The local circulatory troubles, which play so large a part in the ætiology of the ulcer, disappear, and lastly, the dressing allows the secretions to pass away. It can be used as a prophylactic in pregnancy when varicose veins are very pronounced. The greatest advantage of the treatment is that it allows the patients to keep at their work, while at the same time healing takes place quickly. (*Med. Blaetter*, 11 Jan., 1906.)

TREATMENT OF DIPHTHERIA.

Bourget (Lausanne) has been able to ascertain in several cases of diphtheria, in which, for various reasons, injections of anti-diphtheritic serum were not used, an exceptionally favourable course. Finding that the number of these cases increased, he devoted himself to improving the local treatment, and now reserves the serum treatment for the most serious cases. Of 547 cases treated from 1899 to 1905 inclusive, 365 cases were treated without injections, with 2 deaths, and 166 with injections (14 deaths). Bacteriological examinations were always made. The local treatment treatment begins as soon as the patient enters the hospital, and consists of careful swabbing of the parts with the following :—

℞ Liq. Ferri Perchloridi - - - - - -
Aluminis pulv. - - - - - } āā ʒss.
Acidi Borici - - - - - - - -
Glycerini - - - - - - ʒvj.

Five or six swabbings are made carefully and minutely with this one after the other, and then the patient is made to gargle with :—

℞ Tinct. Guaiaci - - - - - - - -
Tinct. Rhatan. - - - - - } partes æq.

Two teaspoonfuls in a tumbler of warm water.

This treatment is continued every two hours, or every hour if the case is serious. Improvement is rapid, the temperature often falls on the third or fourth day.

Bacteriological examinations have no value for prognosis, since very serious cases are met with showing but few of Lœffler's bacillus, and *vice versâ*.

Bourget is not a believer in the curative action of antitoxin, and considers that the question has not as yet got beyond the region of theory. (*Therap. Monatshefte*, Jan., 1906.)

TREATMENT OF SEBORRHŒA OF THE SCALP.

Lecturing at the Hôpital Saint Louis, Brocq dealt with this subject at some length. True seborrhœa of the scalp is characterised by an excessive secretion of fat, but it is also often accompanied with a certain degree of hyperhidrosis and fatty crusts of more or less thickness, becoming like psoriasis in appearance. In the simple form the oily secretion with abundant desquamation prevails.

In the case of a man affected with the simple form, the hair must be cropped quite short, and every evening the scalp must be treated, following the direction of the hair, with a lotion of thirty drops of liquid

polysulphide of potassium (Potassa sulphurata) in a quarter of a tumblerful of hot water. Small soft brushes must be used for the purpose, which must be washed from time to time in petroleum ether. The quantity of polysulphide can be increased by five drops, but if this produces any sensation of burning the dose must be lessened. Each morning the scalp is to be rubbed with the following:—

℞. Formol. - - - - ♏ xv.—℥iss.
Ess. Amygdal. amar. - - - q.s. (to scent).
Alcohol. - - - - ℥iiss. M.

If the formol cannot be borne, it can be replaced by the following:—

℞. Sodii biborat. - - - - } ℥i.—℥ss.
Æther. Sulphuric. - - - }
Alcohol. - - - - āā ℥i.
Aq. Destill. - - - - ad ℥viij. M.

To prevent the sprouting on the following can be rubbed in:—

℞. Acid. Acetic. Crystal. - - - ℥j.
Formol. - - - - - ℥iss.
Pilocarpin. Hydrochlor. - - - gr. xv.
Alcohol. (90°) - - - - - ad ℥viij. M.

When the scalp trouble is more accentuated, the above treatment should be replaced by the following:—

℞. Resorcin. - - - - - gr. xxx.
Sulphuris - - - - - ℥j.
Alcohol. - - - - - ℥iss.
Glycerini - - - - - ℥j.
Aq. Destill. - - - - ad ℥x. M.

This mixture requires to be briskly shaken up just before use; a small quantity is then placed in a saucer, and applied to the scalp with a piece of wool. It is removed in the morning by petroleum ether. If it is possible to leave it on for five or six nights, an application should be made every evening, and the head then well washed with soap. The loss of hair appears at first to be increased when the first washings are made, but in reality it is the total amount which would have fallen in the interval.

This last method is, perhaps, that most suitable for women, whose hair cannot be cropped. The hair should be disposed in a series of rays, at the base of each of which the lotion is applied for five or six days in succession. The head is then washed, and the treatment resumed. In less serious cases the first-mentioned mixtures can be rubbed in, care being taken to rub in the direction of the hair, and to sponge afterwards with wool. This method of treatment is, however, very long and troublesome, but Brocq goes on to say that it must not be forgotten that in women the nervous system plays a leading part even in affections of the scalp, and that, in certain among them, the constant preoccupation as to the state of their hair, and the minute, and ofttimes inopportune, care and attention they bestow upon it, constitute a real obsession, the influence of which may be most troublesome, and which it is necessary to abate by every possible means.

In the same lecture, Brocq described an ointment which is very largely used at the Saint-Louis, the active principles of which are tar, camphor, and sulphur. Its method of preparation appears to have a special influence upon its mode of action, for the sulphur never causes its usual irritant effects. It

is known as the Baume de Duret, after the hospital pharmacist, and has the following composition:—

℞. Picis Liquidæ	ʒivss.
Ol. Cadini	ʒiv.
Resorcini	gr. xxx.
Menthol.	ʒiss.
Guaiacol.	ʒiss.
Camphoræ	ʒiss.
Sulphuris Præcip.	ʒss.
Boracis	ʒiss.
Glycerini	ʒij.
Acetoni	ʒiij.
Ol. Ricini	ʒiss.
Lanolini	ʒiiiss. M.

Some of these constituents enter into combination, like camphor and guaiacol which form an analgesic compound; the sulphur is not only in a state of suspension, but is combined and dissolved. The solution is obtained by warming it in a closed vessel to 130° with the mixture of tar, oil of cade, castor oil, and lanoline. Acetone was selected as the vehicle because it is equally mixable with fatty bodies and with water, and in virtue of this possesses great power of penetration and of dissolution, while its sedative properties make it an excellent excipient.

The Baume Duret unites to the special properties of tar, oil of cade, and sulphur, antipruriginous powers, and has been used with success at the Hôpital Saint-Louis and Hôpital Broca in eczema, seborrhœa, acne, impetigo, sycosis, folliculitis, pruritus, and so forth.

The parts affected are covered with the ointment by means of a cotton-wool swab, or by the hand, and it is of advantage to cover up the dressing with sterilised bandages covered with cerasine, a neutral body not absorbing fatty bodies. (*Journ. de Med. et de Chir. pratiques*, 10th February 1906.)

TREATMENT OF SERIOUS AND EXTENSIVE BURNS WITH LARGE INJECTIONS OF SALT SOLUTION.

In his *Thèse de Lille*, Le Jariel makes a very complete study from a pathogenic point of view of the fatal effects of severe and extensive burns, and shows that these can be most usefully fought by means of big injections of salt-solution. These fatal effects are attributed to special changes and alterations in the blood, which arise from the considerable increase of density and the resultant loss of fluidity of the blood-stream. As a consequence, the increase of the red cells (corpuscular stasis), the greater amount of carbonic acid retained in the blood, and the profound affection of the nutritive exchanges of the plasma produce a true functional paralysis of the blood, which reacts upon all the organs, and ends in phenomena of intoxication by general inadequacy of elimination and retention of toxic products, uneliminated, and always most abundant.

The best method, therefore, of counteracting these symptoms is to dilute the blood, and thus restore to it part of its properties. In the case of burns with very large blisters, occupying a large superficial area, shock, more or less pronounced, is rarely fatal, and gives place very soon to prostration.

Temperature and pain may remain the only symptoms, but serious general affections may appear, characterised by delirium or coma, visceral congestions especially in the lungs, a considerable fall in the amount of urine, a bad pulse, irregular and weak, intense thirst, remarkable dryness of the skin, constipation or profuse diarrhœa. It is necessary to act without delay, especially when the last-mentioned symptom presents. The amount injected must be large, 2,000 c.c. a day, in two administrations, or even more, until the symptoms abate.

When the acute stage is passed, the daily amount can be gradually lessened. The liquid used is either sterilised salt-solution 8 per 8,000 or Hayem's solution (sulphate of soda, 10 grammes; chloride of soda, 5 grammes; distilled and sterilised water, 1,000 grammes); and should be at a temperature of about 98·6° F. The glass container should have a capacity of a litre, and be fixed about one metre and a half above the patient. A trocar (No. 1 or 2 of Potain's apparatus) should be used in preference to a needle, as the latter yields too slow a flow and is easily choked. The site for injection is the inner wall of the axilla (border of the pectoralis major), the abdominal parietes, or the front surface of the thighs. The injection should not be allowed to distend the skin too rapidly, and it will usually be found that, when 150 to 200 c.c. have passed in, the flow is arrested. The tumour must be gently kneaded, and the point of the trocar may be moved a little.

When furious delirium sets in, accompanying high fever, the patient must be placed for ten minutes in a bath at a temperature of 78°, which must be lowered to 68°.

This method of treatment brings about a surprising change, the urine becomes abundant, sweating breaks out, the temperature falls, excitement passes off, and consciousness returns. (*Journ. de Med. et de Chir. prat.*, Feb., 1906.)

TREATMENT OF CHRONIC PHARYNGITIS.

The *Journal de Medicine et de Chirurgie pratiques* quotes the following suggestions by La Croix, in his *Précis de Laryngologie*, for the treatment of chronic pharyngitis. He insists upon the stoppage of tobacco and alcohol, prescribes a general treatment appropriate to rheumatism, and examines the nasal fossæ. For the pharyngitis itself he gives gargles sprays, and swabbings.

1. ℞. Sodii Borat. - - - - - - ʒiiss.
   Sodii Benzoat. - - - - - - ʒj.
   Glycerini - - - - - - ʒv.
   Sp. Menth. Pip. - - - - - ʒj.
   Aq. Destill. - - - - - ad ʒxvj. M.
   For use as a gargle two or three times a day.
2. ℞. Sodii Benzoat - - - - - - ʒj.
   Aq. - - - - - - ad ʒiij. M.
   For use as a spray morning and evening.
3. ℞. Menthol. - - - - - - gr. xv.
   Ol. Vaselini - - - - - - ʒvj. M.

For swabbing the throat to relieve cough and the feeling of discomfort.

In addition to these preparations, iodised collutories should be used once or twice a week. The concentration must vary according to the

tolerance shown by the patient. The friction employed should be fairly active.

Weak iodised glycerine :--

℞. Tinct, Iodi - - - - - - ℥ss.
Glycerini - - - - - - ℥iij.

Strong iodised glycerine :—

℞ Tinct. Iodi - - - - - ℥iij.
Glycerini - - - - - - ℥ss. M.

Weak iodo-iodide :—

℞ Iodi - - - - - gr. ¼.
Potass. Iodid. - - - - - gr. xv.
Aq. ad - - - - - ℥vi. M.

Strong iodo-iodide :—

℞ Iodi - - - - - } āā gr. xv.
Potass. Iodid. - - - - }
Aq. ad - - - - - - ℥iij.

When the pharynx is irritable, Lacroix replaces these iodised collutories by a mixture of menthol (2 parts) and resorcin (1 part). These are triturated until they liquefy to form an amber-coloured syrupy liquid, with which the affected mucous membrane is gently swabbed once or twice a week.

TREATMENT OF GASTRIC AND INTESTINAL HÆMORRHAGES.

Ewald states that he has not obtained results from the use of adrenaline as a hæmostatic in these cases, that gelatine has succeeded no better in whatever method given, and that chloride of calcium has proved equally ineffectual. On the other hand where these have failed, he has succeeded by washing out the stomach with iced water. He begins by giving a small injection of morphia, and then applies cocaine freely to the pharynx in order to abolish all reflexes. The tube at the beginning of the operation should scarcely pass beyond the cardia. The lavage is continued until the water returns untinted with blood, and at times the amount required to effect this is very large. The bowels are also washed out so as to free the alimentary canal from blood, which has passed through the pylorus and often gives rise to trouble. Collapse must be treated with subcutaneous injections of salt solution (7·5 per 1,000), introduced into the subclavicular region.

It is difficult to decide whether a hæmatemesis requires operative intervention, for it often happens that symptoms which appear very threatening disappear quickly, thanks to a well carried-out internal treatment, which provides that with the lowering of the blood pressure, thrombosis is more easily effected. Moreover, surgical methods do not always yield good results, for it is not always possible to discover the site of the hæmorrhage.

Intestinal hæmorrhages are more easily dealt with locally. Hæmorrhoidal flux is best treated with cold water in a Sitz-bath ; placing pieces of ice in the rectum ; and tampons, soaked in equal parts of hydrastis and hamamelis, can be introduced through the anus. External piles should be anointed several times during the day with the following ointment :—

℞ Ext. Belladonnæ - - - - - gr. xij.
Chrysarobini - - - - - - - - gr. ivss.
Iodoformi - - - - - - gr. ix.
Vaselini - - - - - - - - - ℥ss. M.

When internal piles are present, suppositories should be given, each containing :—

℞ Chrysarobini - - - - - gr. i¼.
Iodoformi - - - - - - - - gr. ⅓.
Ext. Belladonnæ - - - - - gr. ⅙.
Ol. Theobromatis - - - - - - gr. xxx. M.

In conclusion, Ewald draws attention to the fact that continuous hæmorrhage from the bowel may be due to piles situated some distance above the anus, of the existence of which the patient is ignorant as the stools only contain small quantities of bloody mucus. The best method of curing this condition of things, which suggests pernicious anæmia, is to destroy the bunches with Paquelin's cautery. For intestinal hæmorrhages, the styptics first mentioned have been found a little more efficacious than in the case of the stomach. (*Berlin klin. Wochenschr.*, 5 March, 1906.)

ENEMATA AND IRRIGATIONS.

Sternberg, writing in the *Deutsche med. Wochenschrift* (Nos. 6 and 7, 1906), warns against the use of scented soaps for making a soap enema, since they may contain toxic essences. Oil enemata given at night are useful in chronic constipation occurring in people occupied during the day, but nervous patients who sleep badly will do better to wait until morning for their injection. Oil enemata are also very effective in the case of peritoneal adhesions, which usually assert their presence by painful crises preceding the act of defæcation. The treatment should be applied two or three times during the year. For the first fortnight an enema is given every day, then every second day for the ensuing fortnight, then twice a week, and finally once a week.

Injections of tannin (1 or 2 per cent.) cannot be recommended in the treatment of catarrhal enteritis, since they cause pain and pathological changes in the mucous membrane of the large intestine. Diarrhœa in tuberculosis is very often due to a simple catarrh not tuberculous in origin, and can then be easily treated by regular enemata of solution of salicylic acid, 3 per 1,000. Irrigations must not be used if there is reason to suspect appendicitis, as there is always imminent danger of perforation in this affection.

In the case of biliary lithiasis, he recommends the daily use of enemata, composed of a quarter of a litre of sesame oil, a piece of soap the size of a nut, half a litre of hot water and a pinch of carbonate of soda to aid emulsion. The effect of this treatment is often remarkable; in weakly patients the enema should be given every other day.

The systematic use of simple enemata exerts an action, too often ignored, upon the circulation in arterio-sclerosis, for it often happens that this apparently simple measure may bring about a crisis of grave prognosis.

Medical enemata must always be of small bulk, about 2 ozs. for example, with marsh-mallow or gum arabic for basis. Among these, Sternberg draws special attention to enemata of collargol (1 or 2 per cent.) in the case of puerperal troubles. For nutritive enemata he recommends milk, the yolks of two eggs, a pinch of salt and some drops of laudanum. Fats and carbohydrates are not well absorbed by the rectum. The enema-tube should be inserted to a distance of five centimetres above the plane of the perineum, long tubes nearly always remain in the rectal ampulla where they are bent up.

Enemata should always be given in the lateral position; in the dorsal when the patient is giving it to himself.

Notes by the Way.

A Great National Movement.

We wish to call the attention of our readers to a great National Movement which has been under consideration for some time, and which is now in working order. Its object is to provide a Permanent Annual Fund for pushing forward the crusade against Consumption, and for the promotion of research into the causation and cure of Cancer. A prominent feature is the conferment of benefits upon all those taking part in it, but the one most strongly appealing to medical practitioners is that which makes the payment of their professional fees absolutely sure. When a practitioner attends a person who is taking part in the Movement, the settlement of his account will follow within one month. This is a point that will be much appreciated by the medical profession. A booklet containing full particulars may be obtained free on application to the offices, which have been specially taken for "The Practitioner" Fund, at 167, Strand, London, W.C.

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Patent Medicines.

The American Medical Association is taking the lead in a crusade against patent medicines. That the patent medicine is too much with us will be freely admitted; that many nostrums which come under that designation have not the virtues claimed for them cannot be gainsaid; and that some are harmful, even to the point of danger, while others are openly recommended for criminal purposes is beyond all question. The persons who advertise these things are too often utterly unscrupulous, holding with "Sir Roger," of unsavoury memory, that the people with money and no brains are made for those with brains and no money. They find the public an easy prey, for the reason, bluntly stated by Carlyle, that the 41½ millions who make up the population of these islands are mostly fools. The public, gulled, as people have been since the ancestral ape got a thumb to his fist, by loud pretence, buys patent

medicines and vexes its system with much drugging. If doctors point out the mischief thus caused, and denounce the papers which publish the lying statements that beguile the people, it is said they fear the competition of the advertising quack. They have no reason to fear it, for the blind believer in drugs is sure, sooner or later, to lose faith in his fetish, and to have recourse to the doctor. The medical profession, therefore, has no particular interest to serve by denouncing nostrums; on the other hand, the vendors, the newspaper proprietors, and the Government, all of whom thrive on the sale of these preparations, may be said to be in league for the promotion of this undesirable form of commercial enterprise. The Home Secretary said, not long ago, that the only remedy for the nostrum evil is the spread of education. This may be taken to mean that he does not deem it expedient to interfere with a source of considerable revenue, for Mr. Gladstone is too intelligent not to know that quackery flourishes as rankly among "educated" people as among the ignorant. Only a training that gives a clear understanding of the scientific principles which form the foundation of the art of healing can create the mental atmosphere wherein a belief in quackery, which is a variety of superstition, cannot live.

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Medical Support of Nostrums.

In an address which is published in the *Maryland Medical Journal* for February, Mr. Samuel Hopkins Adams, one of the leaders of the American crusade, points out that the trade in patent medicines receives strong support from the medical profession itself. Not only do many of these preparations originate from within the profession, but the vendors seem never to have the slightest difficulty in procuring testimonials as to the efficacy of their wares from medical practitioners. Many of these are given in the good faith bred of a holy simplicity. In some cases, however, it may be permissible to suspect that the giver of the testimonial has not been inspired solely by scientific conviction; it is well known that, even in our own happy land of truth and righteousness, large fees are paid to men who, if not altogether reputable, have managed to gain a certain reputation, for proclaiming the virtues of medicinal

substances in what purport to be honest contributions to medical literature.

This sort of thing seems to be a recognised form of professional industry in Germany; at least, it is only on this hypothesis that we can explain the enormous output of papers setting forth the thaumaturgic effects of new therapeutic agents made in Germany, which are reprinted and circulated all over the world by the manufacturers. In America, the bulk of the ostensibly medical journals are really run by advertising agencies, or in the interest of trading concerns.

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Testimonials from Scientific Authorities.

Of their methods of procuring testimonials from scientific authorities, Mr. Adams tells an amusing story which at the same time sheds an instructive sidelight on the peculiar code of professional honour that may exist even in high places. We must let him tell his tale in his own racy style:

"Foreign testimony from men of standing is much easier to obtain than domestic. Why this should be so has puzzled me for some time, but I discovered the reason while investigating that remarkable fake germ-killer, Liquozone. The Liquozone Company announced that it had secured the services of Professor Pouchet of Paris as their scientific representative in France. My first impression was that Professor Pouchet was probably another home-made myth, like the famous German savant, Professor Pauli, whom Liquozone created and subsequently dissipated. Inquiry showed, however, that there really is a Prof. G. Pouchet of Paris, that he holds a responsible position under the government, and that, although not a scientist of the first rank, he stands well professionally. *Collier's* sent its Paris representative to interview Professor Pouchet.

"'Have you lent your name to any patent medicine, Professor?' asked the interviewer.

"'I? No; I do not do that sort of thing.'

"'Then the Liquozone Company is using your name without authority.'

"'Ah, the Liquozone Company? That matter is in process.'

"'Then you are doing some work for them, and they are authorised to use your name in America?'

"A translation, giving the spirit rather than the letter of the learned professor's next remark, is best couched in a familiar American idiom:

"'America! I don't give a damn for America! Nobody knows me in America.'

"There, I fancy, we have the attitude of the average foreign specialist towards American patent medicines which pay liberally."

The gentleman, whose conveniently elastic professional conscience thus enables him to adapt it to the standard of either hemisphere, is doubtless Dr. Gabriel Pouchet, Member of the Académie de Médecine, and Professor of Materia Medica and Pharmacology in the Paris Faculty of Medicine. At any rate he is the only "Professor G. Pouchet" whose name we can find in the official lists.

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The Education of the Public.

WHILE legislation for the protection of the public from an especially crafty class of *chevaliers d'industrie* is imperatively called for, it is equally important that the public should be taught to do something to help itself in the matter. The knowledge necessary to this end can come only from those who know, that is to say, from doctors; but with the false notions of professional ethics which prevail at present, doctors are afraid to discharge what is a plain duty. Unless they condescend to enlighten the public mind, how on earth is the darkness in which it is shrouded to be dissipated? Let us take example from America, where, we note with pleasure, lectures for the information of the laity are now being given under the auspices of the New York Academy of Medicine. Among the subjects dealt with are patent and proprietary medicines, pure food, pure drugs, tuberculosis, and the education and professional training of nurses. In Austria an organised propaganda for the diffusion of sound knowledge about vaccination is being carried out by medical lecturers. This plan is adopted by anti-vaccinists, anti-vivisectionists, and by advocates of forms of error and quackery. *Fas et ab hoste doceri.*

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Hospitals for the Middle Classes.

At the present day illness is a much more costly affair than it was when the ubiquitous microbe was undreamt of and the New Nurse had not come on the scene. Only the wealthy can afford all the luxuries of modern surgery and hygiene, which are given by the hospitals to the poor for nothing. For the great struggling middle class, which has not the requisite accommodation at home, there is no provision. When persons of moderate means have the misfortune to need the help of surgery, they are driven to the hospital. They are not fit objects for charity, which they are often most unwilling to accept; yet the hospital can scarcely turn them away. Some hospitals have pay wards, but these are so few that they may be treated as a negligible quantity. The want of adequate provision for the needs of sufferers who can afford to pay moderate fees is becoming one of the most serious problems with which we in this country have to deal. In Germany it has been practically solved by the grading of hospitals in three classes according to the means of the patient. In this way the shop-keeper, the clerk, the governess, and the struggling professional man can get the full advantages of medical science without the least taint of pauperism. According to Mr. Sydney Holland, the problem has also been solved in the United States and in our colonies, but in a somewhat different way. There, he says, in all the large cities, and in many of the small ones, are institutions provided by the municipality or by other means, thoroughly well-built, far better equipped than any private nursing home, and guaranteed as regards appliances and sanitation. Any patient, no matter what his circumstances may be, is admitted into these institutions on payment of a charge which varies from a few shillings a week for accommodation in a ward to as many pounds for a separate suite of apartments, replete, as the auctioneers say, with every convenience and luxury of modern life. The patient is attended by his own doctor, the arrangement as to fees being left entirely to be settled between the contracting parties. It is a pure matter of business. There, not only the bank clerk and the school usher, but the millionaire is taken when they have to come under the surgeon's knife, because it is the best place in which an operation can be

performed. It has been built for the purpose, and all elements of risk have been eliminated as thoroughly as can be done by human effort directed by the most advanced science. Mr. Holland suggests that the remedy for the present difficulty, which presses grievously on the hospitals owing to the great and needless expense thereby caused, is the establishment in London of an institution of the kind described. It must, he urges, be in a healthy and quiet neighbourhood, "not too far from the locality in which public opinion condemns the majority of surgeons to reside." It is obvious, however, that one institution, even of the most palatial dimensions, would be altogether insufficient for the purpose. Moreover, it is by no means clear why it should be situated in the region where surgeons most do congregate. It would surely be far better in every way that there should be a number of smaller pay hospitals scattered about the vast area of the metropolis and its suburbs. Patients could then be ministered to by their own local doctors and the assistance of the higher surgery could be invoked *pro re nata*. It is only by cordial co-operation between the various sections of the profession that the scheme can be secured; and no scheme that leaves out the general practitioner has any chance of success.

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Proposed Division of Fees.

A GRIEVANCE of the general practitioner in France is the disproportionately large fees received by surgeons. Dr. Berthod suggests that the surgeon should divide his fee with the general practitioner; of course this would be done openly, patients and magistrates being duly informed of the arrangement. There seem to us to be several objections to this proposal. In the first place, it would have to be accepted by the surgeons, and about that there might be difficulties. If it were accepted by them, it would lead to a proportionate increase of fees, and here the profession would have to reckon with the public. The system, though practised in a manner naked and unashamed, would not tend to enhance the dignity of the profession. The true remedy, it seems to us, is that the general practitioners should agree to charge more adequate fees. In regard to their relations with surgeons

they have remedy in their own hands. Everything can be done by combination, and a system of boycott judiciously applied would soon bring surgeons who may be disposed to ignore the rights and interests of the general practitioner to a more reasonable frame of mind.

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The Truth about the Cigarette.

We are threatened by well-meaning, but not very wise, Members of Parliament with grandmotherly legislation about cigarette smoking on the lines of that which has already proved ineffective in the United States. There the prohibition of the cigarette has led boys who smoke to exchange their mild indulgence in paper flavoured with tobacco for the fiercer joys of the cigar and the pipe. Probably Dr. Macnamara's Bill, if it becomes law, will have the same result here. It is not easy for those who know anything of the action of tobacco on the human frame to understand the horror with which so many worthy persons regard the cigarette. That smoking in excess is not good for boy, or man, or woman, is a matter as to which all are agreed. As has often been pointed out, the cigarette is more injurious than the cigar or the pipe, because it is more insidious. It is exactly like tippling ; though taken in small doses, a good deal of tobacco can be got through if one smokes all day long. But to ban the cigarette utterly because it may be abused is simply foolish. An amazing amount of rubbish is talked about the matter by intemperate enthusiasts. Tobacco is said to be poisonous because it contains nicotine, and we hear it repeated in all seriousness

> How one or two at most
> Drops make a cat a ghost,
> Doctors have said it.

The fallacies of the teaching of anti-tobacco fanatics have lately been exposed by Dr. Leonard K. Hirshberg in the *Maryland Medical Journal*. He quotes numerous recognised pharmacological authorities, among them Smiedeberg of Strassburg, Meyer of Vienna, and Abel of Johns Hopkins, who are unanimous in declaring that the nicotine absorbed has no action whatever. The statement that a single drop of nicotine placed on the tongue of a dog will soon kill the animal, with the moral attached thereto, that an ordinary cigar contains nicotine enough

to kill two men if taken pure, he declares to be absolutely false. A single drop of nicotine, he says, will not kill a dog in the manner described, and "an ordinary cigar, used in the ordinary way, containing its usual amount of pure nicotine, will not kill two flies." As to the paper which is held accountable for all sorts of evils, analyses made in London, Boston, Washington, and New York have failed to reveal the presence of any poison whatever. Nor has any narcotic, such as morphine, belladonna, or hyoscine, ever been found in cigarettes. Dr. Hirshberg states that, in the records of some two thousand carefully recorded autopsies at the Baltimore City and Johns Hopkins Hospitals, there is no mention of any death due to cigarettes, and no note of any organic changes whatever that could honestly be attributed to cigarettes. Where, then, he not unreasonably asks, are all those "cigarette brains," and "heart failures," and "tobacco hearts" of which so much is heard? Their basis of fact, we are told, is found in such conditions as toxic amblyopia, and in the idiosyncrasy of certain exceptional individuals "less exceptional, perhaps, than the sensitive people who are nauseated by milk." Dr. Hirshberg seems to us to put the matter on a rational footing. The anti-tobacco agitation, like some other latter-day propagandas, has its origin in the mistaken notion that the rule of healthy life must in everything be adapted, not to the average man, but to the weaker vessels.

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Competitions. THE result of the Competition for March is as follows:—The best essay was sent by Dr. Stanley Box, of Ealing; and the best answers to the questions by Dr. L. W. Shadwell, of Avonmouth, Bristol. Cheques have accordingly been sent to these gentlemen.

Practical Notes.

PHYSIOLOGY: *The Origin of Uric Acid.*—It is now well known that uric acid is not formed in the kidneys, but simply eliminated by them. When the kidneys are removed from an animal, uric acid continues to be produced, and accumulates in the organs of the body, more especially in the spleen and liver. From birds, this latter organ has been successfully removed with the result that practically no uric acid is formed, its place being taken by ammonia and lactic acid. It is probable, therefore, that in birds the ammonia and lactic acid, which are produced as the result of metabolism, are taken to the liver, and there normally synthesised to form uric acid. These results, however, are no guide to the question of the origin of uric acid in man, in whom the output of uric acid in the 24 hours is very small, rarely exceeding more than 10 grains.

It is thought by many physiologists that the chief precursor of uric acid in the body is a substance called *nucleo-proteid*, or by the more recently suggested name *nucleo-proteide*. The nucleo-proteides are compounds of proteids, with a complex organic acid called nucleic acid, which contains a fair percentage of phosphorus. These bodies are found in the nuclei and protoplasm of the cells of the body and in the cells contained in the food. The uric acid, which is derived from the nucleo-proteid of the body cells, is known as the *endogenous* uric acid, whereas that which comes from the nuclein in the food is termed *exogenous*. It has been shown that nucleo-proteid upon artificial gastric digestion yields proteid, which is readily converted into peptone, and which goes into solution, and nuclein, which persists as an insoluble residue. If this residue is dissolved in an alkali, and a little hydrochloric acid added, it yields more proteid and a further precipitate, which chiefly consists of nucleic acid. If this nucleic acid is heated with hydrochloric acid in a sealed tube, it yields bodies like thymic acid, a reducing sugar, phosphoric acid, and bodies known as the *purine bases*, or *xanthine bases*. These latter substances are all closely allied chemically to uric acid, as has

been shown by Emil Fischer, for they are all derivatives of the substance known as *purine*. Purine has the formula $C_5H_4N_4$. Monoxy-purine, or hypoxanthine, is $C_5H_4N_4O$, dioxy-purine, or xanthine, is $C_5H_4N_4O_2$, and trioxy-purine, or uric acid, has the formula $C_5H_4N_4O_3$. From this it may be seen that uric acid may arise as an oxidation product of purine, which is derived from nucleo-proteid, which ultimately comes from the nuclei and protoplasm of the cells of the human body and of the food put into the body. Increase of the white corpuscles in the blood, which is of course associated with an increase of the metabolism of their nuclei, leads to an increased formation of uric acid. This occurs in both splenomedullary and lymphatic leucocythæmia. An increase of meat diet, especially one consisting of various kinds of sweetbreads (thymus or testis), or liver, leads to an increased formation of uric acid. In the general condition known as gout, there may be either an increased formation of uric acid in the body, or a condition of the blood plasma, which results in a diminution of its alkalinity and which therefore prevents the ready solubility of uric acid; hence its deposition in the tissues, or a defective elimination of the uric acid by the kidneys. On the other hand, there may be any combination of these processes resulting in a deposition of uric acid in the tissues. It must be borne in mind, however, that, normally, uric acid is not present in the free state in the body, but combined with bases forming soluble urates. Those which occur in the urine are the acid sodium urate $C_5H_3NaN_4O_3$, and the normal sodium urate $C_5H_2Na_2N_4O_3$. The former salt is the chief constituent of the pinkish deposit of urates, which so often occurs in the urine on cooling, especially when the specific gravity is high, as is frequently the case after copious sweating, following active exercise and also acute rheumatism.

The uric acid output is very small upon a farinaceous diet, and is very little affected by adding to such a diet a large amount of proteid in the form of the white of egg. Caseinogen, the principal proteid of milk, and vitellin, the proteid of the yolk of egg, bodies known as phospho-proteins, on artificial gastric digestion, do not yield the purine, or xanthine bases; and these articles of diet may, therefore, with benefit be given to those persons who suffer from either acute or chronic gout. With regard to the actual organ in which uric acid is

formed, there is at present very little evidence. Fresh splenic extract contains hypoxanthin and xanthin, and the passage of oxygen through the splenic pulp for some hours causes a conversion of this xanthin into uric acid.

The forms which uric acid assumes when precipitated from human urine are very various. Those which most frequently occur are whetstone shape ; there are also bundles of crystals resembling sheaves, barrel-shaped crystals, lozenge-shaped crystals, and occasionally dumb-bells. Pure uric acid crystals are colourless, but those usually found precipitated in urine are cayenne-pepper coloured, due to the fact that they take down with them the normal colouring matter of the urine.

Uric Acid Calculi.—These are usually met with in persons suffering from lithiasis, as indicated by the passage of sand, or gravel, in the urine. These calculi are primarily excreted in a crystalline form from the renal tubules, and become deposited in the substance of the kidney ; later they get into the pelvis of the kidney and produce there calculus pyelitis. Frequently they pass along the ureter, causing the symptoms of renal colic, sometimes they become impacted in one of the three ureteral straits, but more frequently are passed into the bladder, where they usually increase in size. Should the calculus, during its passage along the ureter, become impacted, and the kidney, from which the calculus has come, be the only one available for excretory purposes, or if both ureters are similarly obstructed, the patient, if unrelieved, dies in a few days from suppression of urine, a condition known as calculus anuria. If the ureter is only partly obstructed by the calculus, the changes which take place in the kidney are much more gradual, and result in either hydronephrosis or pyonephrosis. Uric acid calculi, which occur in the bladder, are more frequently found in youth and middle age. They are of moderate size, oval and laterally compressed. They are of a brown colour, finely granular or smooth, heavy and hard, on section they are laminated. If a portion of such a calculus is placed in the blow-pipe flame, it is completely destroyed, giving off a smell of burnt feathers. Uric acid calculi are insoluble in weak hydrochloric acid, but soluble in warm alkalies. Uric acid gives the murexide test which is

as follows :—A little uric acid is placed in a capsule and a little dilute nitric acid added, this is evaporated to dryness. A yellowish-red residue is left, to this a little ammonia is added. The residue becomes purple in colour, due to the formation of murexide, or purpurate of ammonia. On the addition of potash, the colour becomes distinctly blue. Schiff's test for uric acid may be performed as follows :—The uric acid crystals are dissolved in a solution of sodium carbonate. A drop of this solution is then placed on blotting-paper and a drop of silver nitrate solution added. If this spot is gently warmed, the black colour of reduced silver is seen on the paper.

The Treatment of Gout.—Writing in a recent number of the *Deutsche med. Woch.*, Professor Minkowski, of Cologne, says that although there is much which is not clear in the pathogenesis of gout, yet, ætiologically, the accumulation of uric acid in the body appears certain. This, as the author of the above-mentioned paper points out, is concerned less with an abnormally abundant formation than with the irregularity of its excretion by the kidneys. This latter may be due to some abnormal method of the combination of the uric acid in the blood plasma, and in the various fluids of the tissues, which again, on their part, result from some complicated metabolic anomaly, which takes place for the greater part in the substance of the nuclei of the tissue cells. The widespread assumption that a general diminution of the process of oxidation lies at the root of gout, Professor Minkowski pronounces to be inaccurate, at all events until further proof is afforded. In the local deposits of uric acid, there is no doubt that some unknown toxic, infectious and traumatic factors, must come up for full consideration, nevertheless the actual attack of gout may be looked upon as an expression of the reaction of the tissues directed towards the prevention of these depositions. The known anomaly of metabolism depends upon a hereditarily transmissible disposition towards gout, and this is favoured by an excessive intake of food, misuse of alcohol, lack of proper exercise, chronic lead poisoning, and many chronic affections of the digestive organs. For these last-mentioned cases, Falkenstein's hydrochloric acid treatment must be therapeutically considered. For the

est, alcohol must be restricted, and the food carefully regulated, especially should uric acid forming, rich in nuclein foods, such as thymus, liver, kidneys, sweatbreads, be prohibited. Meat and leguminous plants must be restricted, while indigestible and strongly spiced foods must be absolutely forbidden. The reduction of uric acid formation in the body by medicinal means is uncertain. Quinic acid and its combinations, such as urosin, sidonal, chinotropin, urol, to which the above-mentioned property has been ascribed, probably act like salicylic acid, which is akin to them, as an anti-neuralgic. Uric acid excretion is, according to Minkowski, promoted by the intake of large quantities of mineral waters, while the salicylic preparations, ordered for this purpose, certainly act more particularly through their anodyne and sudorific properties. Acceleration of the uric acid oxidation by means of alkalies, oxygen inhalation, and the internal use of thyroiodine and spermine, Minkowski considers impossible.

The efforts to carry over the uric acid in some easily soluble combinations have succeeded, up to the present time, better in test-tubes than in the body. In this connection, lithium salts, piperazin and lysidin have been tried without any special result. Formaldehyde, as urotropin or citarin, has acted more favourably, especially in cases of uric acid calculi. Amongst the many nerve-tonics and anti-neuralgics, colchicum, the action of which is still not understood, does much good in relieving pain. The main points, however, remain, the regulation of the food, and the habits of life of the individual.

It has been suggested that colchicum acts as an intestinal cleanser ; but after all mercury, either as blue pill or calomel, in the early stages of gout, is one of the best remedies, since, by its cholagogue action and its purging, it thoroughly clears out the intestinal contents.

In treating an acute attack of gout, it will be found that a brisk mercurial purge is always advantageous at the outset. This should be followed by the following medicine :—

R. Tinct. Colchici - - - ♏ xx.
Potassii Citratis - - - - gr. xx.
Aq. Chloroformi - - - ad ℥j.
Ft. Mist.

Two tablespoonfuls to be taken every four hours until the

pain is relieved. In most cases it will be found that the colchicum soon relieves the pain, and reduces the redness and swelling of the gouty joint. It should be stopped, however, as soon as the pain is relieved.

The following medicine is also a useful combination :—

R.	Tinct. Colchici	℥ xx.
	Tinct. Belladonnæ	℥ v.
	Tinct. Cimicifugæ	℥ vj.
	Potassii Bicarbonatis	gr. xij.
	Inf. Gent. Co.	ad ʒj.

Ft. Mist.

Two tablespoonfuls to be taken every four hours until the pain is relieved.

Dr. Burney Yeo recommends for a robust patient, with an uncomplicated attack of acute articular gout, moderate doses of colchicum in combination with an alkaline saline aperient, such as the following :—

R.	Magnesii Sulphatis	ʒiss.
	Magnesiæ Levis	ʒij.
	Potassii Citratis	ʒiv.
	Tinct. Colchici	ʒij.
	Aq. Carui	ad ʒviij.

M. Ft. Mist.

Two tablespoonfuls, with two of hot water, to be taken every three hours until the bowels have been freely relieved, after which the magnesium sulphate should be omitted, and, when the pain in the affected joint is relieved, the mixture should be given every six hours instead of every three.

Occasionally, it may be that the use of colchicum is contra-indicated, or because of diarrhœa, which sometimes exists in what is called suppressed gout, aperients have to be avoided, when the following mixture will be found to be useful :—

R.	Sodii Salicylatis	ʒij.
	Lithii Salicylatis	gr. xl.
	Potassii Citratis	ʒiv.
	Tinct. Zingib.	℥ xx.
	Aq. Cinnam.	ad ʒviij.

M. Ft. Mist.

Two tablespoonfuls to be taken every two or three hours until the pain is relieved, then every five or six hours.

For chronic gout Sir William Whitla recommends the following :—

℞. Potassii Iodidi - - - ʒij.
Potassii Bicarbonatis - - - ʒvj.
Vini Colchici - - - - ʒij.
Aq. Camphor. - - - - ℥xij.
M. Ft. Mist.

A tablespoonful to be taken three times a day in a wine-glassful of water after meals.

The Case for Commentary in the March Number. —A deep punctured wound in the thigh in the region of the apex of Scarpa's triangle may involve either the common femoral, superficial femoral, or deep femoral arteries, or their corresponding veins. From the history of the present case, it is obvious that the wound produced by the long, sharp pointed, narrow-bladed, clean knife, must have involved the coats of one of the arteries already mentioned, and so long as the patient was kept quiet in bed, there was little, if any, bulging of the wall of the vessel, but after only ten days' rest the patient resumed his work as a carpenter, which involved a great deal of stooping. As a result of movement and increased force of the heart beat, which followed the exertion, the arterial wall commenced to give, causing the appearance of a small pulsating swelling on the site of the original wound. This was a traumatic aneurysm, which the next day became diffuse, and the blood, which escaped into the connective tissue of the region, pressed upon the superficial and profunda femoral veins, causing the œdema of the limb mentioned. The treatment would be to elevate the limb in order to get as much blood as possible out of it, then to bandage firmly from the toes upwards, to control the blood flow in the common femoral artery by pressure, or by a tourniquet, then to cut down over the swelling, using all due antiseptic precautions. The clots of blood should be carefully removed, and if a wound was found in the artery, or arteries, it should be carefully sutured ; if, however, the arteries had been too badly lacerated to allow of this being done, then double ligatures should be applied above and below the wounded area. The wound should then be dressed carefully, and the limb kept elevated and warm, and the condition of the toes carefully watched in case gangrene should set in.

Novelties and Notices.

HUMANOID.

(The Aylesbury Dairy Company, Limited, Bayswater, London.)

This is one of the numerous preparations of "humanised" milk, and is supplied in carefully sealed bottles. In the process of preparation, it has been somewhat concentrated, hence, when made ready for use, one part of Humanoid should be diluted with two parts of boiled water, and, of course, when given to the infant, the whole should be warmed to about 100° F. Humanoid will keep when open longer than fresh milk. It contains fat in a true emulsion, and cream separates out on standing. We consider this preparation an excellent substitute for human milk.

POLLYTA.

(The Aylesbury Dairy Company, Limited, Bayswater, London.)

We find Pollyta to be a scientifically prepared complete food, which contains starch, and is suitable for infants from seven to twelve months old. The food is readily prepared, if the directions supplied are carried out. Pollyta may be obtained of all chemists, and the price is certainly very moderate. From the fact that the food contains starch, it is evident that it is not intended for quite young babies.

MALVERN SPRING WATERS.

(Messrs. W. and J. Burrow, The Springs, Malvern.)

The desirability of having perfectly pure water for drinking purposes goes without question, and the utility and qualities of the Malvern Waters are too well known to need further description here. In order to enable those who desire to use these waters, and who from various circumstances are unable to reside in Malvern, Messrs. Burrow have put upon the market, at a reasonable price, Malvern Waters both still and sparkling, and also with various medicinal and other additions. All are of exquisite purity and furnish the most healthful and refreshing beverages.

DIABETIC GLUTEN BREAD AND "ESSENTIEL" BREAD.

(Chas. Heudebert's Patent.)

(Importer and Sole Consignee, R. O. Bischof, 35, Brooke Street, Holborn, E.C.)

These patent breads have been especially prepared for the use of diabetic patients, and are admirably adapted for the purpose for which they are intended. The Gluten Bread, which should be used until the sugar has completely disappeared, that is for from 10 to 30 days, contains according to the English analysis only about 17·5 per cent. of carbohydrates, and according to the French only a little over 10 per cent.; and about 70 per cent. of nitrogenous matters. This goes far to satisfy the requirements of the diabetic patient in the first instance. The use of "Essentiel" Bread should then follow. This contains a high percentage of nitrogenous constituents in conjunction with phosphates and carbohydrates, and is also useful for persons suffering from dyspepsia, overwork, or tuberculosis, and especially where animal food cannot be retained. Both breads are prepared in an agreeable form and are not unpalatable. They are packed in boxes of about one pound.

THE "TABLOID" PRODUCTS OF IRON.

(Messrs. Burroughs Wellcome & Co., London, Sydney and Cape Town.)

The best example of these products is the "Tabloid" Blaud Pill, for the advantages of these pills are clinical, as well as pharmaceutical. They give the greatest increase in hæmoglobin; they are small, compact, portable, and are easily swallowed by those who experience difficulty in taking ordinary pills; they are accurate and represent a definite proportion of ferrous carbonate, 20 per cent., and they form *nascent* ferrous carbonate in the stomach with certainty. They are all sugar coated, and supplied to the profession in bottles of 100.

"ENULE" GALL AND OPIUM.

(Messrs. Burroughs Wellcome & Co., London, Sydney and Cape Town.)

"Enule" gall and opium presents an effective and convenient means of prescribing opium with the astringent

principle of galls in the form of a suppository. Each contains ext. opii ¼ gr. = ·016 gm. and tannic acid 3 gr. : = ·194 gm., equivalent to 5 gr. = ·324 gm. of galls. In the case of hæmorrhoids, rectal ulcer, fissure, congestion of the mucosa, rectal discharges, &c., the use of the "Enule" product is highly recommended. The suppositories are issued in boxes of one dozen, and are separately protected by a covering of easily removable pure tinfoil.

HÆMOSTASIN AND PARAGANGLIN.

(Messrs. Burgoyne, Burbidges & Co., 16, Coleman Street, London, E.C.)

Hæmostasin.—This most powerful astringent and hæmostatic is the active principle of the suprarenal glands, and is supplied in a cheap form in small phial bottles in a neat case. In cases of scorbutus, purpura, hæmophilia, hæmaturia, hæmoptysis, hæmatemesis, profuse hæmorrhage, gastric and intestinal hæmorrhage, it may be administered either per os, or as a subcutaneous injection.

A solution with cocaine will secure in 10 minutes the anæsthesia and anæmia necessary in minor operations, and is largely employed in opthalmology and in otorhinolaryngological and dental practice. In gynæcological practice, plugs of cotton wool soaked in 1 : 1000 to 1 : 2000 solution should be employed.

Paraganglin.—In the treatment of gastro-intestinal atony and general asthenia, paraganglin appears to be eminently suitable. It has been employed successfully in these conditions and also in hemicrania arising from vascular paralysis, anæmia, and rachitis, and also as a hæmostatic.

PARKE, DAVIS AND CO.'S SPECIALITIES.

(Messrs. Parke, Davis & Co., Queen Victoria Street., London, E.C.)

Acetozone (Benzol-acetyl-peroxide), in solution, is powerfully germicidal, non-toxic, and practically harmless to animal tissues. In varying strengths, it is successful in typhoid, dysentery, in intestinal fermentation, &c. As a lotion, it is of value in erysipelas and ringworm, and as an injection, in gonorrhœa, puerperal fever, &c.

Acetozone Inhalant is a solution of acetozone and chlorelone in liquid paraffin, and is valuable in all infections, or bacterial diseases of the nose, mouth, ear, or throat, also in bronchitis, and is best applied by means of the "Glaseptic Nebuliser."

Thyroidectin is a powder prepared from the blood of animals which have been deprived of the thyroid gland. Its use in Graves' disease has nearly always been followed by marked improvement. The powder is neatly put up in capsules, each containing 5 grains.

Scopolamine and Morphine Hypodermic Tablets.—Each tablet contains $\frac{1}{64}$ gr. Scopolamine Hydrobromide, and $\frac{2}{3}$ gr. Morphine Hydrochloride. The use of these tablets is recommended for the production of general anæsthesia, or as an aid to ether or chloroform, or also alone when these latter are contraindicated.

Throat, Mentholated. Compressed Tablet 427. Each tablet contains $\frac{1}{35}$ gr. Menthol, $\frac{1}{12}$ gr. Benzoic Acid, $\frac{1}{80}$ min. Oil of Anise, and $\frac{1}{16}$ min. Eucalyptol. One tablet, allowed to dissolve in the mouth occasionally, is found to be very useful in inflammation of the throat and bronchi, allaying cough and facilitating expectoration.

"HYGICS"—HYGIENIC SANITARY TOWELS.

(Messrs. Hunter & Co., Parliament Street, Nottingham.)

These towels, which are made of loosely-knitted cotton, are highly absorbent and very inflammable. They can be readily washed, or easily burned, if necessary. From a hygienic standpoint, they are, therefore, particularly useful. Messrs. Hunter & Co. have introduced an elastic "comfort" belt, to which the towel can be easily attached, and ease, comfort, and effectiveness thereby secured. The price of towels and belt is exceedingly moderate.

COMPETITIONS.

We offer our readers every month two Prizes on the conditions stated below.

A Prize of Two Guineas will be given to the author of the best Essay on a subject to be announced by the Editor.

A Prize of One Guinea will be given to the competitor who writes the best answers to three questions relating to Medical or Surgical Cases.

Results of the April Competitions will be announced in the June number.

a.—The Subject of the Essay for May will be

The Causation of Infantile Convulsions.

b.—Answers to the following questions are invited :—

1. What are the causes of Paraplegia?

2. What treatment would you advocate in a case of Ankylostomiasis?

3. A man, aged 45, gives the following history:—For the last fifteen years he has had considerable difficulty in passing urine; latterly the stream has become so small that at times the urine can only be voided by drops and then only, after considerable straining. At night he has to get up three or four times to pass urine, and during the day his shirt is always wet with urine. Whilst straining to pass water, the patient suddenly felt a sharp pain in the perinæum followed by a swelling, this was accompanied by a burning and a tingling sensation, ending in an acute throbbing pain, the perinæum and scrotum became rapidly swollen and very tense. What is the diagnosis of this case? What treatment would you suggest? What course did the perinæal swelling take?

GENERAL CONDITIONS.

A.—All MSS. relating to the Essay must be marked on the top left-hand corner "Essay," and must be sent to the Editor of The Practitioner, 149, Strand, W.C., on or before the 1st day of June, 1906. The answers to the above Questions must not exceed eight hundred words.

B.—All MSS. giving answers to the Questions must be marked on the top left-hand corner "Questions," and must be sent to the Editor on or before the 1st day of June, 1906.

C.—No Essay will be returned unless a special request is made, accompanied by a stamped addressed envelope.

A and B.—(1) One side of the paper only must be written on.

(2) The name or pseudonym, and address of the competitor must be clearly written on each sheet of paper used.

(3) The decision of the Editor is final.

(4) Competitors must be registered General Practitioners.

(5) The attached Coupon must be filled up by each competitor.

THE PRACTITIONER.

JUNE, 1906.

SOME OBSCURE CASES OF URINARY DISORDER.

By R. C. ELSWORTH, M.D., F.R.C.S. (Eng.),

Surgeon to the Swansea Hospital.

In studying any case of urinary disorders that may come under our notice, there are certain classical symptoms which it is well to keep prominently before the mind, in order that we may avoid some, at least, of the many pitfalls which beset our way to a correct diagnosis. These classical symptoms may be briefly stated to be :—Pain ; frequency of micturition and urgency of micturition ; pus ; mucus ; blood ; reaction of the urine.

Having thus briefly tabulated the signs and symptoms, it will, perhaps, not be unprofitable to consider each one separately, in order to ascertain what information we can obtain, and what value to put upon it.

Pain.—As a general rule, we may say that the lower the lesion in the genito-urinary system the lower is the region in which the pain is complained of. Thus in lesions of the bladder, pain is mostly felt in the perinæum, urethra, and bladder ; while in lesions of the kidney, the patient chiefly complains of pain in the back. But though this may be very well as a general statement, it must be admitted that it falls very far short of the truth, and is of but very limited use as a guide. For we find that, in cases where a lesion exists in the kidney, though there is pain in the back, it extends along the line of the ureter and into the testicle, perinæum and bladder. While, on the other hand, I have removed calculi from the kidney of a man who had never experienced any pain in the back, nor in any other part of the genito-urinary system. In the same way in lesions of the lower urinary tract, it is not common to find the pain reflected back to those organs at a higher level in the system. The point that I wish to bring out is that the position of the pain is, at best, but a fallible guide, and but little assistance is to be obtained from

it alone. The character of the pain varies. It may be intermittent, as in many bladder cases, or it may be constant, as in obstruction of a ureter, and in any case it is liable to exacerbations. In some cases, it is made worse by exertion and relieved by rest, while in others rest brings no alleviation.

Frequency of micturition is a common symptom upon which much stress is laid, and particular importance is attached to the period of the day in which the frequency occurs, as indicating the special region involved. For instance, nocturnal frequency of micturition is supposed to indicate that the bladder is chiefly at fault. Possibly that may be so. But I am firmly persuaded that the frequency of micturition is more closely associated with the irritating character of the fluid to be expelled, than with the site of the lesion, or period of the day. The frequency of micturition may become so much increased, both by day and by night, that the patient becomes worn out by the constant unrest and loss of sleep.

Closely associated with the frequency of micturition is the urgency of that act, and I think it may be taken as an axiom that the urgency of micturition varies directly with the frequency of micturition, and, like that act, is dependent on the character of the fluid to be expelled.

Pus.—Of all the abnormal constituents of the urine, there is none which produces so marked an effect on the mucous surfaces over which it passes. Every part of the mucous membrane, over which the pus passes, is irritated, overstimulated, and may be excoriated, and this in the bladder expresses itself in intolerance of the offending fluid, and its immediate expulsion from that viscus. The amount of pus centained in the urine varies greatly with the site and nature of the lesion, and it may be developed at any point, or points, in the whole system. As the development of pus in the urinary organs means the development of pus in a tract of mucous membrane, it follows that its occurrence in the urine is always accompanied by an abnormal amount of mucus, and this probably reaches its maximum in those cases of chronic cystitis with alkaline urine.

Blood.—The occurrence of blood in the urine may be taken as a certain sign of a breach in the integrity of some part

of the mucous membrane of the genito-urinary system, and as such would be a valuable sign ; but for the fact that all breaches of the mucous membrane do not give rise to blood in the urine. So that we are driven to the conclusion that, if there is blood in the urine, it is certain evidence of a breach in the mucous membrane in some part of its course ; but that, if there is no blood, it is no evidence to the contrary.

Reaction.—The reaction of the urine in disease of the urinary organs is an important aid to diagnosis ; but not, as I was once fain to suppose, an infallible one. The usual impression is that cystitis, for example, old-standing cystitis, means alkaline urine with a quantity of mucus. It is more probable that alkaline urine, even in chronic cystitis, means residual urine, means, in fact a bladder that is never emptied. The reaction of the urine is acid, and the degree of acidity varies not only in different individuals, but at different times in the same individual.

It may be considered that these remarks partake of the nature of a destructive criticism of the classical symptoms of urinary disorders, but my old beliefs have been rudely shaken, and my faith is no longer what it was.

Although the urinary system is of comparatively small dimensions, and although, so far as we are here concerned, it is comprised of three organs only, viz., the bladder and kidneys, with their excretory ducts, the ureters ; yet such is the complexity of the arrangement, under diseased conditions, that, for many decades, the ingenuity of men has been taxed to devise some method whereby its knotty problems might be solved once and for all. But as yet we have not attained to that perfection.

After we have concluded a careful clinical examination of a patient, we may still be far from a definite conclusion as to the exact pathological condition, which produces the symptoms, and we may also be unable to say which organ is the seat of the lesion. Let us take an example. A patient is suffering from pain, frequency of micturition with acid pyuria. From clinical examination, it may be quite impossible to say whether the patient is suffering from a bladder lesion, or a kidney lesion, and, if we are able to exclude the bladder, it may be impossible to say which kidney is affected.

The difficulty has a twofold origin, because the changes in

the affected organ may not be sufficiently gross to be palpable, and because the urine of the healthy kidney is contaminated with that of the affected side. That this is a very real difficulty is shown by the fact that so many ingenious devices have been brought forward in order to obtain the urine from each kidney separately. With a view to accomplish this object, Dr. Tuchman introduced his ureteral clamp, an instrument shaped like a lithotrite. With this instrument he proposed to, and actually did, clamp the lower end of the ureter in the bladder, and was thus enabled to obtain the urine from the opposite kidney. But the difficulty of using the instrument, of being sure that the ureter was completely clamped, and the risk of traumatism to the bladder and ureter, prevented its general acceptance, and it consequently enjoyed but a short and very limited favour.

Some years ago, Harris brought forward his segregator, by which, by producing a median ridge in the bladder, with a fossa at each side and the end of a catheter dipping into it, it was hoped that the urine from each kidney could be kept separate. But the use of the instrument caused so much pain that few could tolerate it without an anæsthetic.

Later, Luy invented his separator, which, by interposing a rubber diaphragm in the middle line of the bladder, was intended to carry off the urine from each ureter separately. But, alas for both these instruments, they presupposed a healthy bladder, which experience shows to be fallacious, and, even apart from that, it is not possible to be sure that there is no contamination of the urine from the healthy side.

Kelly introduced a series of specula, which can be passed through the urethra of the female after dilatation, and a limited surface of the vesical mucous membrane inspected, as well as the ureteral orifices, and through which the ureters can be catheterized.

There is no doubt that the cystoscope will entirely supersede, if it has not already done so, the various mechanical devices for separating the urines, and rightly so, for it gives much more extensive information, and, what is especially important, it eliminates or not, as the case may be, the bladder as a factor in each instance, and with it the ureters may be catheterized in cases where that is considered necessary.

With these few remarks, we may pass on to the consideration of some obscure cases, which trample underfoot the classic symptoms, and render impotent the aid they are sometimes supposed to give in the diagnosis of urinary disorders.

Case 1, *æt.* 34.—Had always been a healthy man, had been in India, and through the South African War. He had had two attacks of cystitis, the last while in South Africa. Both attacks got well under treatment, and he remained well till the present attack. The present attack resembled the previous ones, but had resisted all efforts at treatment. He had great frequency of micturition, and was not able to retain his water for an hour at a time. He had pain in the perinæum, along the urethra and in the bladder, which came on in paroxysms after micturition and quite independently of it, he had also pain in the back, and some tenderness in the loin on percussion. There was no stone, the urine was acid, and contained pus and mucus, but no blood. He was worn out with pain and loss of sleep.

Owing to the pain in the back and tenderness over the left kidney associated with acid pyuria, I thought it probable that he had stone in the kidney. Accordingly I cut down on the left kidney, and explored it, and the ureter as well, but found nothing. The wound was closed with drainage, and the patient sent back to bed. His distressing symptoms were in no way relieved. The wound healed without complication.

On examining the patient at a subsequent date, he complained of pain in the right loin, and on percussion showed marked tenderness. The question which presented itself was, Is this an instance where the pain of a calculus has been referred to the opposite side, and the calculus has been in the right kidney all the time? The matter was explained to the patient, and he was advised to have the right kidney explored, which he agreed to have done. The right kidney was explored with a like negative result, and the symptoms remained unrelieved. A cystoscopic examination was made a few days later, and the case at once became clear. On the posterior surface of the bladder, a little above the base of the trigone, was an irregular ulcer about the size of a sixpenny piece,

surrounded by a zone of intense congestion, and coated with a cloud of mucus. About an inch to the left of this ulcer was a second about the size of a split pea, also surrounded by an areola of congested mucous membrane.

Suprapubic cystotomy was performed, and the bladder drained continuously till after a considerable time the ulcers were seen to have healed, when the patient was discharged well.

Case 2, *æt.* 25.—A collier. Had always been healthy till five weeks before admission. He complained of frequency of micturition, pain in the point of the penis, and along the urethra, especially during micturition and after it. He had no pain on movement, nor on changing his position, as lying down and getting up again. The urine was acid, and contained both pus and mucus, but no blood. He was sounded, but there was no stone. A cystoscopic examination was then made, and a small ulcer was discovered a little distance above the base of the trigone in the middle line. It was irregula in shape, coated with mucus, and surrounded with a zone of inflamed mucous membrane. Suprapubic cystotomy was performed, and the bladder drained continuously till the ulcer healed, and the patient was discharged well.

Case 3, *æt.* 27.—Had always been healthy and had had two children. About three months before admission, she observed that her urine contained some blood, and presently the amount of blood began steadily to increase, and at the same time she began to have increased frequency of micturition, which became so marked that her rest was much interfered with, and the pain, which she had been having, became so severe as to be almost unbearable, and from being at first chiefly associated with micturition, it now became continuous with exacerbations during that act. The urine was acid, and contained pus, mucus and blood, but no clots. The bladder was sounded, but no stone was discovered. A cystoscopic examination revealed numerous small ulcers, more or less coated with cretaceous material enveloped in mucus, and each bleeding readily when touched. They were surrounded by a zone of redness, and were all small and irregular in shape.

Suprapubic cystotomy was performed, and continuous

drainage maintained till the ulcers healed. The patient has remained well for upwards of six years.

Case 4, *æt.* 35.—Had always been healthy and had had four children. She was quite well till three weeks before admission, when, quite suddenly, and without any previous symptoms, she began to pass blood in her urine. She had much pain in the back and loins, frequency of micturition both day and night, so that she had to urinate every hour, which act aggravated the pain she felt in the abdomen, bladder, and urethra. The urine was acid, and contained blood-albumin but no pus. Cystoscopic examination revealed varicose veins of the base of the bladder; there was no stone and no ulceration. The hæmaturia ceased spontaneously two days after the cystoscopy, and the patient has remained well since.

Case 5, *æt.* 21.—Had always been healthy till two years ago, when she began to have pain in the small of the back, especially on the left side, along the line of the left ureter and in the vulva, with increased frequency of micturition, and laterally by the passage of a jelly-like material per urethram.

When first seen she was anæmic but otherwise healthy looking. She complained of great frequency of micturition, having to get up as many as eight and ten times in the night. She had constant pain in the back and along the line of the left ureter, which became much aggravated on exertion. She had marked tenderness on percussion and on deep pressure over the left kidney and loin, but none on the right side. Her temperature was normal, the urine was acid, and contained a quantity of pus, some mucus, but no blood. Cystoscopic examination showed the bladder to be healthy, and there was no stone; but pus could be seen issuing from the left ureter, while the right only emitted clear water. A diagnosis of pyelitis, probably due to calculus, was made, and an operation was recommended.

The operation was accordingly undertaken, and the left kidney exposed and explored for stone, but no stone was found in the kidney, calices, pelvis, or ureter. A sensation as of grit was felt in several places in the pyramids, but no grit was subsequently found. By the time that the exploration of the kidney was accomplished, the destruction of the organ was complete, and it was, therefore, excised.

The wound was closed with drainage, and the patient made an uneventful recovery. The urinary troubles, which had distressed the patient so long, ceased at once after the operation.

Case 6, *æt.* 25.—Had always been healthy and strong. He complained of pain in the left loin and along the line of the left ureter, and of frequency of micturition, which, he said, had been going on for the last two years. He had tenderness on percussion over the left kidney, and on pressure over the middle of the left ureter, but none over the right side. The urine was acid, and contained a small quantity of pus and mucus, but no blood. Cystoscopic examination revealed nothing abnormal in the bladder, but flaky pus could be seen issuing from the left ureter, whilst the right ureter gave forth only clear water.

A diagnosis of pyelitis, probably due to calculus, was made, and operation recommended. The left kidney was exposed and explored, but no calculus was found in the kidney, calices, pelvis, or ureter, nor could anything abnormal be discovered. Though the kidney had been completely bisected, it was returned to its normal position and secured there with a few sutures, and the wound was closed with drainage. The pus disappeared from the urine after some time, but the other symptoms were not relieved.

Case 7, *æt.* 23.—She had been ill and under treatment for two years, suffering from what was considered to be cystitis, which had been treated with prolonged lavage of the bladder with some improvement.

When first seen she had great frequency of micturition, having to void urine as many as thirty-five times in the day, and the act was accompanied with great pain. She had also pain in the loin and along the line of the left ureter. Her temperature 100, and, on examination of the abdomen, a tumour was discovered in the left renal region. It was tympanitic on percussion, did not move with respiration, and could easily be tilted up from the loin. The urine was acid, and contained both pus and mucus, but no blood. A cystoscopic examination disclosed pus issuing from the left ureter and clear urine only from the right. The renal tumour must have developed somewhat rapidly, as the patient had

seen an eminent London specialist about two months previously, who reported that the kidneys were all right. A diagnosis of tuberculous kidney was made, and an operation recommended.

The left kidney was exposed through a lumbar incision. The kidney was found to be the seat of multiple abscesses, some of which were very foul. In fact, it was a typical example of strumous kidney. The organ was excised, and the wound closed with drainage. The patient began rapidly to improve and to put on flesh, and when last seen was able to retain her water for five hours.

Case 8, *æt.* 24.—Had always been healthy, and is now well developed though somewhat obese. She was perfectly well till two months before admission, when she began to have pain in the right side of the abdomen and loin. The pain became so severe, and she felt so feverish and ill, that she was unable to attend to her duties as a teacher, and later was obliged to remain in bed. The case was evidently one of some difficulty because she was seen by two medical men, whose opinions did not coincide.

On admission she had a temperature 102. She was obviously ill and in pain, and on examination a tumour was to be felt in the right renal region. It was exquisitely tender to the touch, did not move with respiration, could easily be tilted up from the loin, and was tympanitic on percussion, the tympanitic note extending between the liver dulness and the tumour. The urine was acid, and contained no abnormal constituent, was in fact normal. She had no frequency of micturition, nor any other symptom referable to the urinary organs. A diagnosis of pyonephrosis, probably due to tuberculous disease of the kidney, was made, and it occurred to me that it might be well to stain the urine with an aniline dye, in order to ascertain if the right ureter was completely blocked. The patient was given six grains of medicinal methyline blue in two doses, and a cystoscopic examination about four hours after the second dose was made. The urine deeply stained with methyline blue could be seen issuing from the left ureter, but none from the right, showing that the right ureter was completely blocked. The rhythmical contractions of the right ureter continued, however, the same as on the left side.

Operation.—The right kidney was exposed through a lumbar incision, and multiple small abscesses were found on the anterior surface of the lower half of the kidney and in the substance of the kidney. The kidney was excised, and the patient made an uneventful recovery.

The state of the kidney was very interesting. The lower anterior quarter was infiltrated with abscesses, and there were in it also extensive tuberculous deposits. The calices of the middle and upper portions of the kidney were distended, especially the upper one, and the mucous membrane stained with methyline blue, showing that though no urine was sent into the bladder, yet the upper parts of the kidney were secreting urine and pigment. The lower diseased part of the organ contained no pigment, because the secreting portions were destroyed.

Case 9, *æt.* 57.—Had always been a healthy man till 12 months ago, when he noticed that he was passing blood in his water. This occurred on two occasions only, and, about the same time, he was conscious of some fulness in the left side of the abdomen and loin. He continued his work as a joiner off and on for some time, but six months before admission he ceased work altogether. He had passed no blood in the urine during this time, but suffered from progressive weakness and loss of flesh. Up to the time the case came under my notice, he had no urinary symptoms save those referred to at the beginning of the illness; he was much emaciated, and in the left lumbar region there was a well-defined tumour. It was freely movable, could be easily tilted up from the loin, did not move with respiration, and was tympanitic on percussion. The temperature was normal, he had no urinary symptoms, and his urine was acid and in all other respects normal.

A diagnosis of renal tumour was made, and four grains of medicinal methyline blue were given by the mouth, and a cystoscopic examination was made four hours later. The urine, drawn off prior to washing out the bladder, was deeply stained with methyline blue, but, on examination with the cystoscope, no urine could be seen to emerge from the right ureter, although it was observed continuously for a considerable time. From the left ureter, there issued several jets of

grumous fluid with a brown sediment. The jets from this ureter were shorter and more rapid than is usually seen.

The left kidney was then explored through the abdomen, and it was then found that the tumour had grown forward between the vertebral column and the descending colon. The peritoneum over the tumour was then incised, and after some difficulty, the tumour was delivered together with a considerable length of ureter, which was found to be distended with decolorized blood clot. The cavity from which the tumour had been removed was packed, and the wound closed with drainage. The patient died about ten days after the operation from exhaustion.

The tumour appeared to have originated in the substance of the lower part of the kidney, and to have completely replaced the kidney tissue in that region. In the upper part of the organ, the tumour had grown into the pelvis and calices of the ureter, distending them, and thinning out the kidney tissue, forming a kind of sarconephrosis. Nowhere in the tumour, or in the kidney tissue, could any blue staining be found, so that one must conclude that none of the methyline blue was excreted by that organ. The clot occupying the ureter was free from pigment.

Case 10, *æt.* 33.—Had always been healthy. He complained of passing blood in his urine. The condition came on without any apparent cause, and had lasted five months. The hæmaturia was constant when he was going about, but on two occasions, when he had remained in bed for three weeks at a time, the blood had ceased, only to come on again as soon as he moved about. He had some pain and tenderness in the left loin, and some increase in the frequency of micturition, but the act was not accompanied with any pain. The urine was acid, and contained blood, but no pus.

A cystoscopic examination was made, and discovered nothing abnormal in the bladder. From the right ureter, clear urine could be seen escaping, whilst from the left a considerable quantity of blood issued, mixed with urine, so that the fluid from this ureter was of a deep reddish-brown colour. The diagnosis lay between a tumour of the kidney, and a villous growth of the pelvis of the ureter.

The left kidney was exposed and explored, but nothing in

the nature of a tumour was found in the kidney, calices, pelvis, or ureter. The kidney was excised, and the wound closed with drainage, and the patient made an excellent recovery, and has remained well since.

The condition of the kidney was very interesting. The polar quarters of the kidney were apparently normal to the naked eye; but the intervening half was in a state of intense congestion from the capsule to the apices of the pyramids, and showed numerous points of hæmorrhage into the substance of the organ. The mucous membrane of the pelvis of the ureter also showed numerous points of hæmorrhagic effusion into it.

It will readily be seen that these cases arrange themselves into two groups, which are clearly defined, and separate from each other, viz.:—

1. Those with urinary symptoms; and
2. Those with none.

A still closer study of the cases will show that the first group, *i.e.*, those with urinary symptoms, may be divided into two subclasses, viz.:—

(*a*) Bladder cases; and
(*b*) None bladder cases.

But this subdivision can only be made by adopting another method of examination, namely, by use of the cystoscope. It will be observed that, in this subdivision, one does not say bladder cases and kidney cases, because such a division would exclude the ureter, which, in a certain number of cases, is the sole seat of disease, the kidney being quite normal.

The only method, short of operation, which will give us definite information as to the condition of the ureters is catheterisation of the ureters at different levels from the kidney downwards. In this way it may be possible, in cases of ulceration of a ureter, to pass the ureteral catheter beyond the lesion, unless it happens to be in the pelvis of the ureter, and to obtain the urine before it has become contaminated by passing over the diseased surface.

Let us assume a case of ulceration of a ureter at any level which is separated from the kidney. The lesion once started tends to become chronic by the irritation of acid urine constantly passing over it. The only treatment that would be

of any avail in such a condition would be excision of the affected part of the ureter, and anastomosis, or excision of the kidney on the affected side. Against the former method of treatment the following objections may be mentioned :--

1. It is impossible to say that the ulcer is solitary.

2. The ureter may not be accessible for anastomosis at the seat of lesion.

3. The risk of subsequent stricture, a condition known to occur independently of operation. Against the second method, viz., nephrectomy, it must be admitted that it is a severe operation for so small a lesion ; but, on the other hand, it gives at once complete physical rest to the affected part. It is an operation and mode of treatment analogous to gastro-enterostomy for gastric ulcer, and to colotomy for ulceration of the rectum. Personally, I must express my preference for the latter operation, provided always that there is reasonable evidence that the other kidney is competent to take on the work of both. It is remarkable that, though the ureter may be completely blocked, it continues to contract rhythmically, although not a drop of urine passes along its course ; but after nephrectomy these rhythmical movements cease.

These cases have been brought forward because they present many features of interest, because they present certain difficulties in diagnosis, and because they clearly illustrate the value of the cystoscope as an aid in diagnosis, while, at the same time, they show the limitations of that instrument. It might readily be concluded that, when pus is seen issuing from a ureter, we had obtained final proof that the kidney must be the seat of disease ; but that this is not so is clearly shown by Cases V. and VI., where pus emerged from the ureter in both cases, and yet in both the kidney was apparently normal. On the other hand, as shown by Cases VII. and VIII., no pus or other abnormal constituent may emerge from the ureter, and the urine may be normal, and yet the kidney may be extensively diseased. The cystoscope will give us information as to the condition of the bladder, and it will disclose whether the abnormal constituents of the urine come from one or both ureters, and it will inform us as to whether the ureter is patent or blocked. In the last-named contingency, the information is more readily imparted after the administration of

a pigment, such as an aniline dye, though this is not absolutely necessary.

To return to the symptoms shown by these cases, the following points may be emphasised:—

1. That cystitis lasting for long periods, due to a primary lesion of the bladder, and accompanied throughout its entire course by acid urine, is much more common than is generally supposed.

2. That the occurrence of urinary disorder with acid pyuria, and frequency of micturition, does not mean that a bladder lesion is excluded, and that the lesion is necessarily in the kidney.

3. That it is possible to have extensive disease of the kidney without any urinary symptoms whatsoever, and that too with normal urine.

4. That there may be urinary symptoms consisting of pain, frequency of micturition and acid pyuria, without disease of either kidney, or bladder, the symptoms being due to a lesion in the ureter.

5. That the various organs are so intimately connected that the symptoms produced by disease of one may be common to all.

6. That the differentiation is only possible by physical examination, in which the cystoscope gives valuable aid.

7. That in a certain limited number of cases, the administration of a pigment, such as an aniline dye, facilitates the recognition of a partially, or completely, blocked ureter.

In conclusion, it may be stated that these cases clearly show that it is necessary for some of us, at least, to pause by the wayside of this busy life, and revise some of our old ideas and cherished notions on the symptoms and diagnosis of urinary disorders.

THE THROAT AND NOSE IN RELATION TO PHTHISIS.[1]

By HAROLD BARWELL, M.B. (Lond.), F.R.C.S. (Eng.),

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The upper and lower portions of the respiratory tract are so intimately related that it is not surprising that disease of the one portion reacts upon the other. A knowledge of diseases of the throat and nose is of considerable value to the student of diseases of the chest, and it is self-evident that he should be familiar with the methods of examination of all parts of the upper, as well as of the lower, respiratory tract.

Consumptive patients are very liable, in these regions, not only to tuberculous, but to many non-tuberculous complications, which may have a marked effect on the general progress of the disease. Again, I see a large number of patients, who come to this hospital with symptoms which make them, and sometimes also their medical advisers, fear that they have contracted phthisis, when the trouble is entirely due to disease of the throat and nose. Then there is the question of the relationship of the throat and nose to the ætiology of phthisis. These subjects are all of practical importance, and it may be of interest to consider them in detail.

The most important complication of phthisis in the upper respiratory tract is, of course, tuberculous laryngitis; but I shall not discuss this disease at all here, because it is too large a subject to include among others.

I will refer briefly to the subject of tuberculosis of other parts of the upper respiratory tract. Tuberculous disease of the ear seems to bear no relation to phthisis, but occurs chiefly as an apparently primary lesion in poorly nourished

[1] A post-graduate lecture delivered at the Mount Vernon Hospital for Consumption.

children. Again, if phthisis supervenes in a patient suffering from chronic suppurative otitis, the latter shows no special tendency to take on the characters of tuberculous disease. Lake[1] has seen two cases of apparently primary tuberculous otitis with secondary involvement of the larynx. So also phthisis does not appear to increase the frequency of disease of the accessory sinuses of the nose.

The pharynx and soft palate are not uncommonly attacked, but almost only in the last stages of consumption. Miliary tubercles occur, ulcers are usually multiple, and tend to extend superficially: the lesions are very painful and are practically always the beginning of the end. On the tongue ulcers chiefly attack the tip, edges, and under surface, and their rounded, hollowed-out shape distinguishes them from the irregular cleft-like ulcers of tertiary syphilis. They are very sensitive, and their appearance is of the worst prognostic import.

Tuberculosis of the nose has quite a different clinical significance. It is primary in more than half the cases, and occurs at any stage of consumption, the prognosis is therefore much better. It usually attacks the cartilaginous septum, and, in contradistinction to syphilis, extensive destruction of bone does not occur. In this situation lupus and tuberculosis often seem to me impossible to differentiate, although, perhaps, the large hollowed-out ulcers and definite tumour-formations, or tuberculomata, may be classed as tuberculous, whereas diffuse infiltrations and granulations may be considered as lupus. In the pharynx and larynx, the distinction between these two affections is perfectly plain. In a recent interesting paper, Escat[2] has advanced the theory that all cases of lupus have their origin within the nose, and that the attenuation of the tubercle bacilli, which is the essential feature of lupus, is due to the unfavourable influence of the nasal mucosa, as a culture-ground for these organisms. On such a theory one would expect the lesions in the nose to be intermediate between lupus and tuberculosis, and virulent tuberculous lesions are here certainly very rare.

Various forms of simple laryngitis are unduly common in consumptive patients. This is due to the general ill-health and

[1] Lake and Barwell: *Laryngeal Phthisis*, 2nd edit., p. 4.

[2] *Annales des Maladies de l'Oreille, &c.*, October, 1905.

diminished resistance of the patient, to the effects of coughing, and, most of all, to the irritation of the sputum passing over and lying on the mucous membrane of the larynx. The affection is always bilateral, and both cords are involved to much the same degree. This is the point which, above all others, distinguishes catarrh from tuberculous laryngitis. An affection of the cords confined to, or decidedly more marked on, one side may be due to tubercle, syphilis, cancer, or traumatism, but never to catarrh. So also definite ulceration, or a nodular appearance of the cords, is never caused by simple catarrh. Catarrhal laryngitis, occurring in a phthisical patient, is always a source of anxiety, and must be treated promptly and carefully; for there is no doubt that frequent or persistent catarrhs predispose to tuberculous infection. Acute laryngitis is, for the time being, an absolute contraindication to the open-air treatment; the patient should be confined to one room, with the air well warmed and moistened by a steam-kettle; frequent steam-inhalations are beneficial, and I find that the ordinary Friar's balsam is the most useful medicament to employ in the inhaler. Since there is usually some rhinitis as well, the nose should be syringed twice a day with a warm alkaline lotion, such as Dobell's solution. Absolute rest for the voice is very important.

The more chronic cases of laryngitis are harder to treat; rest for the voice and a more stimulating inhalation, such as vapor pini sylvestris, should be ordered. In the persistent cases there is often nasal obstruction, and where the phthisis is early and not acute, I think that this should be remedied. In the chronic forms, painting once or twice a week with astringents, liquor ferri perchloridi, or nitrate of silver, from one per cent. upwards, is of value. I have had good results from the use of oily solutions in a nebuliser, which has some advantages over the steam-inhaler, for by that process a larger amount of the drug used reaches the larynx, and there is less risk of "catching cold" than after the use of a hot steam-inhalation.

Allied to chronic laryngitis is the affection known as "pachydermia laryngis." This disease is also common in consumptives, and is difficult to distinguish from a form of tuberculous laryngitis attacking the posterior commissure. Indeed Gougenheim considers that tuberculosis is the commonest cause of

pachydermia. Pachydermatous thickening is often seen in cases of chronic nasal suppuration, and I believe that the irritation of the sputum from phthisical lungs may produce the same effect, without there being of necessity any infection of the larynx by the tubercle bacillus.

Pachydermia chiefly affects the cartilaginous glottis as far forward as the vocal processes, and gives rise to thickenings, especially in the angle between the arytænoid cartilage and the posterior commissure. These thickenings are symmetrical, or strictly in the middle line, and a central depression is common; they are regular, firm, and of an opaque white colour, and look as if covered by normal mucous membrane, and the surface is smooth, or finely crenated. On the other hand, typical tuberculous granulations in this situation are irregular and asymmetrical, soft, and semi-translucent, and are often but the edges, or granulating base, of an ulcer seen foreshortened in the mirror. It must be acknowledged, however, that, in consumptive patients, intermediate cases are often seen, in which the differential diagnosis cannot be made with certainty. I have examined pieces removed with a curette from such doubtful cases, and have found a thickened corrugated epithelium, but have not been able to demonstrate typical tubercles in the subepithelial tissues. Such cases, too, remain unchanged over long periods, and, although they are usually diagnosed as tuberculous, they are at least the most benign of all tuberculous laryngeal lesions, cause no symptoms but hoarseness, and require no surgical treatment. I have curetted away the outgrowths in several cases, but they have always returned after repeated removal, though often to a less extent. I am not referring to cases of definite tuberculous ulceration, or large sprouting granulomata, for these can often be made to heal by active treatment with lactic acid and curettage. On the other hand, typical pachydermia should certainly be left alone as regards surgical treatment; rest of the voice, astringent paints and simple sprays, or inhalations, do the most good; small doses of potassium iodide may be given internally, and an alcoholic solution of salicylic acid, one to five per cent., as a pigment, is recommended. As Blumenfeld remarks,[1] thickening at the

[1] *Handbuch der Therapie der chronischen Lungenschwindsucht*, p. 585.

posterior commissure in an otherwise healthy larynx, occurring in a young patient without chronic catarrh, overuse of the voice, or abuse of alcohol, or tobacco, is much more suspicious of tubercle than the same thickening with obvious catarrh of the pharynx and larynx in an elderly person, who strains his voice, or is addicted to drink.

There is a natural tendency to diagnose all laryngeal affections in a phthisical patient as tuberculous, but it need hardly be said that consumption does not exclude other diseases, and I see here, among consumptive patients, a really very considerable number of other laryngeal lesions. In a lecture which I delivered last summer,[1] I mentioned the case of a young girl, with undoubted signs of phthisis, who was sent to me for hoarseness. She had two little symmetrical ulcers on the cords, typical of secondary syphilis; no other signs of syphilis were to be found, but the lesions healed in a fortnight under mercury, without local treatment.

Paralyses of the larynx are by no means uncommon in consumption; left abductor paralysis, in such cases, is due to pressure on the recurrent laryngeal nerve by tuberculous bronchial, or tracheal glands. The right recurrent nerve runs in close apposition to the apex of the right lung, and disease in this region may easily compress it; indeed, phthisis is the commonest cause of unilateral paralysis of the right cord, and the discovery of such a lesion should always lead to a careful examination of the lung. The adductor, or so-called functional paralyses, are also very common in consumptives, and are met with in men as well as in women. They are due to muscular debility, and to local interference with the action of the muscles by catarrhal or tuberculous inflammation. Aphonia in a consumptive is, therefore, no sign that he has tuberculous laryngitis.

Many diseases of the upper respiratory tract produce symptoms which resemble those of phthisis; in this way a number of cases come to this hospital who are found, on examination, to have no signs of consumption, but some disease of the throat or nose. Especially is this the case with adenoid growths in children; these are a common cause of cough, but they also produce at times a marked degree of

[1] *Medical Press and Circular*, August 9, 1905.

malnutrition, failure of growth, loss of flesh, and lack of appetite. Such children fall under the suspicion of being consumptive, and indeed they are often the subjects of bronchitis. The removal of the adenoids, combined with a general tonic treatment, gives brilliant results, for the little patients increase rapidly in weight and in stature, the cough disappears, and fears of phthisis are at an end. Any form of nasal suppuration—disease of the accessory sinuses, ozæna, and the like—chronic pharyngitis and laryngitis, by causing persistent cough and expectoration, may give rise to a suspicion of phthisis. If no definite physical signs of this disease are to be found, it is of great importance to make a careful examination of the nose and throat, lest an obvious cause of all the symptoms should be overlooked. The so-called "latent" empyemata of the nasal sinuses are important from this point of view; the discharge need not be so profuse as to attract attention except during the exacerbations, which the patient looks upon as "colds," to which he thinks he is unusually subject. Nevertheless chronic poisoning from the pus may produce an extraordinary degree of ill-health, and this, with the cough and expectoration, readily simulates the symptoms of phthisis. In the quiescent stage, these nasal empyemata are difficult to detect; a little crust of dried secretion about the middle turbinate body may be the only sign, and should always arouse suspicion.

Chronic pharyngitis, and especially granular pharyngitis, are apt to cause frequent cough and expectoration, and it is a fact that many patients come to this hospital, particularly elderly women, in whom no other disease can be found to explain the symptoms. These are cases of no little difficulty, for the objective appearances bear but little relationship to the severity of the subjective symptoms. The characteristic pink lymphoid granules are to be seen, and the lateral bands of the pharynx, just behind the posterior pillars, are often swollen; enlarged veins cross its posterior wall, and frequently the lymphoid tissue at the base of the tongue, the "lingual tonsil," is also enlarged. Although not exactly a serious affection, it may cause an enormous amount of discomfort, and it is extremely hard to cure. Destruction of the nodules, and obliteration of the venules with the galvano-cautery, together

with the use of vapours, or, better, of oily solutions, in a nebuliser, will always give relief; but anything like a cure can only be obtained by attacking the cause of the complaint. The causes may be divided into three groups. First, digestive disturbances and bad teeth; eating, and especially drinking, too much, combined with insufficient exercise and stuffy rooms. Second, nasal disease; mouth-breathing, even if only nocturnal, is a fruitful source of pharyngitis; nasal suppuration is a still more powerful cause. Third, direct irritation from tobacco-smoke, possibly also from strong alcohol and highly seasoned foods; dusty occupations come under this heading.

This granular pharyngitis, and enlargement of the lateral bands, are also very often seen in consumptive patients, and indeed the pathological changes have been ascribed to the tubercle bacillus. Sokolowski[1] removed part of the hypertrophied tissue from 34 such cases, and pronounced 13 to be tuberculous. Be that as it may, granular pharyngitis is an important cause of cough in consumptive patients, and as such deserves attention.

In cases of hæmoptysis, where there are no signs of disease in the lungs, the question always arises as to whether the bleeding has not come from some part of the upper respiratory tract. Unfortunately, in the large majority of cases, it proceeds from a tuberculous focus in the lungs, which has as yet given rise to no physical signs. Still hæmorrhage does occur from the upper respiratory tract, and it is advisable that it should be looked for as soon after the attack as possible. An adherent clot, or an erosion, or still oozing blood makes the diagnosis plain, which will save the patient much distress, and probably some months' unnecessary residence in a sanatorium. If the examination is delayed until the clot has been washed away, it becomes impossible to substantiate, or exclude, with certainty the source of bleeding; one can only say that there is an ulcer, or an erosion, from which the blood may have come, or that one cannot find the source of the hæmorrhage. It is quite possible, with care and cocaine, to prevent during the examination, all coughing, which is so dangerous in hæmoptysis. The bleeding may come from any part of

[1] Fraenkel's *Archiv für Laryngologie*, Bd. 14, Heft 3, 1903.

the upper respiratory tract, from an enlarged vessel, or erosion in the larynx, from the base of the tongue, or the pharynx, but more especially perhaps from the naso-pharynx, where an adenoid pad has shrivelled at adolescence into a crenated fibrous mass. Hæmorrhage from the nose may also pass backwards, and the blood be coughed up without any escaping from the nostrils to make the diagnosis clear. The bleeding may occur at any time, and may be profuse, but most often it is only of the nature of a few streaks, or a scanty brown rusty expectoration on rising in the morning; the blood is not frothy or intimately mixed with the sputum. It should be remembered that, when the blood undoubtedly comes from the lungs, the patient is often positive that he did not cough it up, but hawked it from the throat.

We are now brought to the question of the treatment of nasal obstructions in patients who have already developed phthisis. The inspired air, by the time it has passed through the healthy nasal passages, has got completely rid of the micro-organisms it contained, estimated by Thomson and Hewlett to enter the nose at an average of 1,500 per hour; in addition to this, it is filtered from dust, warmed and moistened. It is probable that the inspiration of such pure air is a help, and the taking in of dry, cold, and dirty air is a hindrance to the organism in its attempt to rid the lungs of disease. Besides this, mouth-breathing produces laryngitis, and chronic, or recurrent, laryngitis predisposes to tuberculous infection of this organ. From these considerations, I conclude that it is desirable to restore good nasal respiration in consumptive patients, provided always that the pulmonary disease is in an early stage, when arrest may be hoped for. A general puffiness of the turbinate bodies is often due to the concomitant anæmia and loss of tone, and a simple nasal lotion, combined with a course of tonic treatment, especially strychnine, is frequently sufficient. There will generally be no hesitation about small surgical measures, such as the application of the galvano-cautery, or the removal of a spur; but larger operations, as for a deflected septum, may be undertaken with advantage, where the phthisis is early and the general health good. In my experience, such wounds heal quite well in consumptive patients. One should be careful not to remove

too much turbinal tissue, otherwise the filtering action of the nose may be permanently damaged.

Little that is definite can be said on the part played by the upper respiratory tract in the ætiology of phthisis. The evidence in favour of infection of the lungs by direct inhalation, as the usual method, is not satisfactory. Experimentally, infection in this way can, as a rule, only be successfully brought about by the inhalation of very large amounts of spray or dust. This dust, too, is pretty evenly distributed through the lungs, and does not usually preponderate at the apices. The predilection of the tubercle bacillus for this region may, however, be explained by the slower lymphatic absorption from this area. Again, the inhalation theory gives no explanation of the fact that the lungs in children are rarely attacked until the bronchial glands are somewhat extensively diseased. This cannot be due to any local immunity of the tissues; for, when once infected, the lungs of children become rapidly diseased, and make little or no effort towards repair. So also, in a large number of cases of pulmonary tuberculosis, there is evidence of old tuberculous lesions in other parts of the body. When infection does occur by inhalation, it must be *viâ* the mouth, or diseased nasal passages; for air, passing through a healthy nose, is completely freed of micro-organisms. The question of nasal obstruction and of nasal disease thus becomes, from this point of view, a very important one. In this connection, the relationship between ozæna, or atrophic rhinitis, and phthisis is of interest; Alexander[1] examined 50 cases of ozæna in Fraenkel's clinic; and found only 17 without signs of pulmonary tuberculosis. Blumenfeld considers that certain conditions especially favour the entrance of the tubercle bacillus, namely, hypertrophied tonsils and adenoids in childhood, ozæna from the second to the fourth decennium, and the dry catarrh of diabetes in later years. On the other hand, I have rarely seen ozæna among the consumptive patients at the Mount Vernon Hospital.

Bacilli, then, enter the mouth both from the air and in food, so that any distinction between air- and food-infection disapppears. From thence they may pass into the cervical lymphatics through the faucial lymphoid tissue, that is,

[1] Fraenkel's *Archiv für Laryngologie*, Bd. 14, Heft 1.

through the tonsils and adenoid vegetations, without producing, of necessity, any local lesion. There is now little doubt that pulmonary phthisis may be due to infection of the lung from the cervical lymphatics, though whether this is, or is not, the ordinary mode of infection, cannot as yet be stated. In an excellent article on this subject, Dr. Latham[1] considers that the tubercle bacilli may pass from the cervical lymphatics to the glands at the hilus of the lung, and thence against the lymph stream, to its apex; and also that there is a possibility that the apex of the lung may be directly infected from the cervical lymphatics across the apex of the pleura. This latter conclusion is supported by the experiments of Weleminsky.[2]

I will quote from the summary at the end of Dr. Latham's paper:—

"It is improbable that infection often takes place from air inspired through the nasal passages. The tubercle bacilli, whether the infection is through the air or the food, enter the new host by the mouth in the majority of cases, and may then be destroyed by the natural defensive actions of the body, or may pass into various parts of the body in the following ways:—

"(*a*) By direct inhalation into the alveoli of the lungs.

"(*b*) By being brought into contact with the mucous membranes of the parts common to the respiratory and alimentary tracts, such as the tonsils, and then, by passing through these mucous membranes, either with or without local changes, to the lymphatic vessels, and so to the cervical, tracheal, bronchial, or other glands. From these glands they may pass either:—(1) By direct continuity; (2) by the lymphatic vessels to neighbouring glands, as, for example, from the cervical group to the mediastinal; (3) by some mechanism against the lymph stream, as, for example, from a tracheal gland to the apex of the lung. . . .

"The spread of tuberculosis within the human body is by the lymphatic vessels and lymphatic lacunæ. This fact may explain why the lungs are chiefly affected in the adult, and the bronchial glands chiefly affected in the young child, as the age

[1] *Edinburgh Medical Journal*, November, 1902.
[2] *Berliner klinische Wochenschrift*, 1903, No. 3

at which the change begins corresponds with the age at which a considerable alteration in the lymphatic paths in the neighbourhood occurs, owing to the involution of the thymus."

It thus appears probable that the ætiology of pulmonary phthisis may be similar to that of tuberculous infiltration of the glands of the neck ; in fact, that the lungs may be directly infected from disease of the lymphatics in this situation. There is no doubt that the source of infection in tuberculosis of the cervical glands is generally through the faucial ring of lymphoid tissue. This lymphoid tissue would appear to be placed in the fauces as a defence against micro-organisms, and possibly it acts as such in health. Be that as it may, it is certain that when diseased it is a fruitful source of danger, and enlarged glands in the neck are usually associated with hypertrophy and chronic inflammation of the faucial and naso-pharyngeal tonsils. If pulmonary phthisis is due to infection by the same paths, careful attention to these structures, and their timely removal when diseased, become vastly more important.

ON CERTAIN BODIES PRESENT IN THE CHANCRE, IN THE CONDYLOMA, AND IN THE BLOOD DURING SECONDARY SYPHILIS.

By W. E. de KORTÉ, M.B. (Lond.),
From the London Lock Hospital, Soho.

[With Plates XVIII.—XXI.]

The evidence of the infectivity of the blood during the secondary stage of syphilis being very strong, and practically admitted by all syphilologists, it was felt that, whatever the ætiological agent of syphilis might be, it was essential that the causative agent should be recoverable in the blood during the secondary stage of the disease.

The spirochæta pallida has, in my experience, failed to satisfy this essential condition.

Having with great care examined the blood of a large number of syphilitics, including most of the types of secondary syphilides, on no occasion has a single spirochæta, either pallida or refringens, been met with. The conclusion arrived at after prolonged search is, that if the spirochæta pallida be the cause of syphilis, it does not exist as such in the blood.

In the course of this investigation of the blood, the bodies illustrated in the accompanying photomicrographs were encountered. Of their protozoan nature there can be little doubt; of their causal relationship to syphilis it would be premature to speak. The complexity of the life cycle, even from such facts as are adduced in this paper, must be manifest. In certain forms or phases, the parasite can generally be found in the blood, though, for their detection, several blood smears at different intervals may be required, and considerable patience expended on the search.

Technique.—Considerable difficulty has been experienced in differentially staining the parasite in the primary chancre, for the reason that the organism takes up nuclear stains exactly like the inflammatory cells and tissue elements. The method devised cannot be said to be very satisfactory. The process

PLATE XVIII.

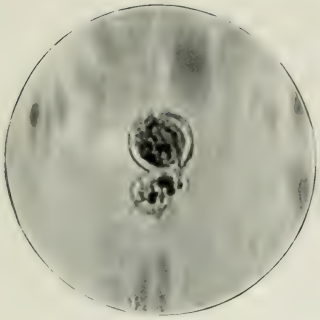

Fig. 1.

Fig. 2.

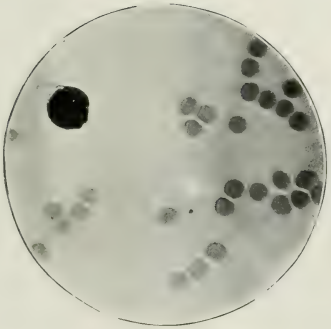

Fig. 3.

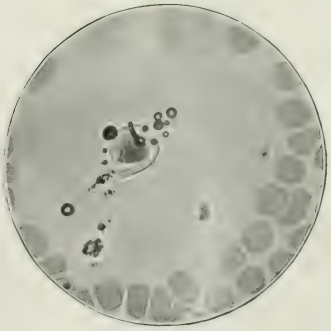

Fig. 4.

PLATE XIX.

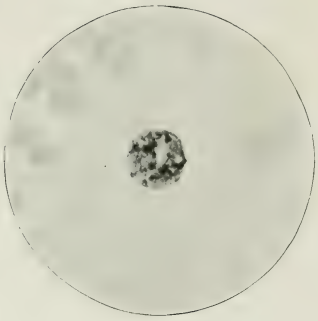

Fig. 5.

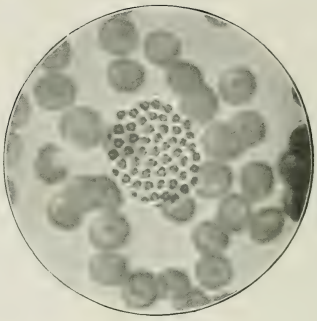

Fig. 6.

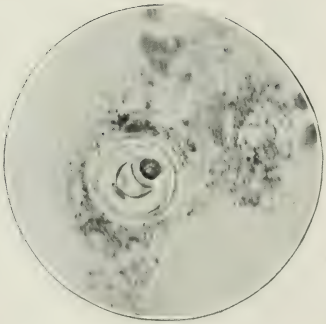

Fig. 7.

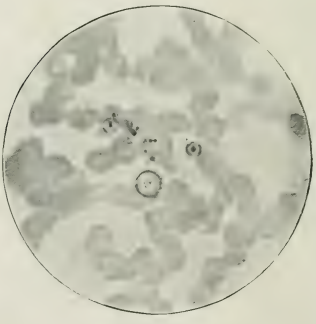

Fig. 8.

destroys the finer structure both of the parasite and of the tissue cells. An excised chancre, for choice, one presenting a large granulating surface, and one in which much fibro-blastic change has not taken place, should be selected.

Thin pieces are fixed in a solution containing 2 parts of saturated aqueous solution of perchloride of mercury, absolute alcohol 1 part, glacial acetic acid ·75 per cent.

After dehydration, clear in cedar wood oil, and embed in paraffin. Sections should be as thin as possible, 15–25 μ.

Pass the section through iodine solution in order to get rid of the crystals of the mercurial salt. The section must next be placed for 3 days, at 37° C., in a bath containing 1 per cent. aqueous solution of silver nitrate, to which sufficient ammonium hydrate, for the purpose of redissolving the precipitate caused by it, is added. After washing, stain for 18 hours in a saturated aqueous solution of aniline safranin. It is again washed, passed through alcohol, and stained for one minute or longer (the effect being watched under the microscope), with ·25 per cent. alcoholic solution of Licht grun. Clear in bergamot oil, and mount in Canada balsam. Fig. 9 × 700 D.

From the condyloma several of the forms can be readily obtained. Scrape the surface of the lesion until it bleeds well. The parasites will not be found lying on the surface. Suspend some of the bloody exudate in normal saline solution, and examine as a hanging drop.

Oval bodies, measuring about 5μ in length, 2μ in breadth, will be seen. Fig. 12 × 1100 D. They have a refractile circular nucleus at each end, and midway between the nuclei, placed close to the cell-wall, a smaller body will be found, having opposite to it some residual protoplasm. At an earlier stage, the nuclei are alone present; the smaller intermediate body being apparent in the cell wall at one end of the oval. Larger bodies with well-marked ectocyst, measuring 12μ, may also be encountered. More permanent preparations of the fresh organism may be made by suspending some of the scrapings in Farrant's solution tinted with a 2 per cent. normal saline solution of methyl green acidulated with acetic acid. The larger forms take up the methyl green readily, and are thus more easily recognised. (*Vide* Fig. 1 × 800 D.) Permanent

specimens are made by fixing a smear with a saturated aqueous solution of mercury perchloride, and staining with hæmatoxylin and eosin, as more fully described farther on. To more readily find in the blood a number of the forms depicted, select an untreated case of about three months' duration, with erythematous rash, the more anæmic the patient the better, or a congenital syphilitic infant about 8 weeks old. When the rash is profuse and well marked the parasites may be difficult to find in the blood.

Tie a finger tightly with string near the proximal phalanx, and let the hand hang down for some minutes, so as to congest the finger as much as possible. Having thoroughly washed the finger, prick it, and take up a drop of the blood on the narrow edge of a microscopic slide and push, not pull, the slide carrying the drop over the surface of a second slide.

Make several smears and allow them to dry in the air. Fix for 2 minutes, or longer, in a freshly filtered, saturated solution of mercury perchloride, wash in distilled water, stain for 10 minutes with Ehrlich's hæmatoxylin, wash with distilled water, then with tap water, and counter stain for a few minutes with a 1 per cent. aqueous solution of eosin. Dry, and mount in Canada balsam. The coverslip should be only gently pressed down, otherwise rupture of some of the elements may occur. Blood-smears may be stained and fixed with Leishmann's or Jenner's stain; but over-staining is apt to occur, and hæmatoxylin gives better results.

The form, which occurs most abundantly when stained, consists of small, very dark circular bodies, measuring from 2μ upwards, and occasionally a small central refractile nucleus can be made out. This form resembles a small air bubble, for which it may be mistaken. These bodies should be found lying between the red corpuscles as well as on them.

This form can be found in the blood in most cases of undoubted syphilis during the secondary stage, while the larger forms are correspondingly common in severer cases.

As it is not possible at present to give a complete and connected account of the various stages of this infusorian, only such links as have been elucidated will be described, and the rest left to a future occasion. Besides the forms illustrated, an

PLATE XX.

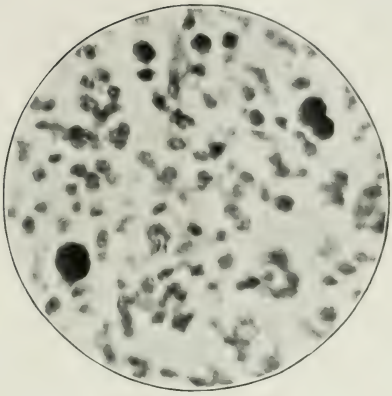

Fig. 9.

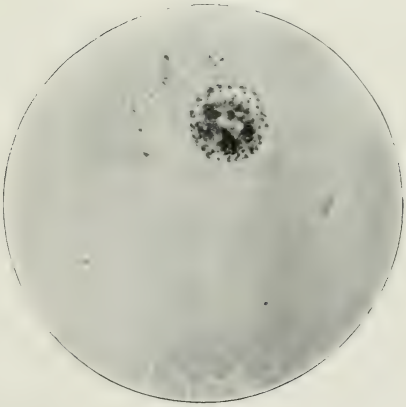

Fig. 10.

PLATE XXI.

Fig. 11.

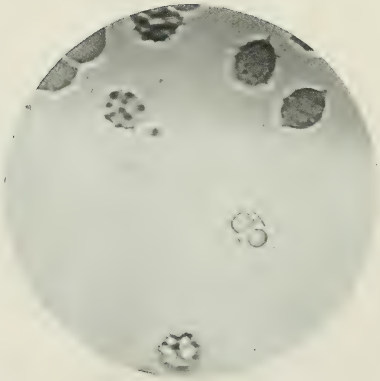

Fig. 12.

oval, motile element having a single long flagellum, resembling in appearance Euglena viridis, has been met with in a large closed acne-like pustule, on the neck of a man with severe syphilis. This element has also been found once in a scraping from a gumma of the tongue. In the blood there is also occasionally met with a cyst measuring 12μ, containing crystalline-looking threads, the whole staining very faintly. It is partly on account of the presence of the euglena-like form that I venture to suggest that this infusorian belongs to the class "Ciliata."

The most common form, as before stated, is illustrated in Fig. 2 × 800 D. The first change detected in this body is the extrusion of two polar bodies (?), possibly prior to fertilisation. At a later stage the cyst consists of a hyaline ectocyst and a very dark endocyst. The element next secretes a gelatinous coat, which, as shown in Fig. 3, becomes drawn out as a delicate spoke-like process at each pole. *Cf. Cyst* of Dileptus anser. Two small folds occur in the endocyst at one of the poles about the pore or primitive mouth. Fig. 3 × 600 D. (from the blood of a congenital syphilitic æt. 7 weeks). At this stage the element is about to multiply, and contains in its interior a circular hyaline micronucleus (?) measuring 3μ, a larger, faintly granular body—possibly a macronucleus—measuring 4μ, and a pigmented body intermediate in size.

Fig. 4 × 1100 D. shows the endocyst ruptured, the gelatinous coat well developed, and the young progeny escaping into it. Some pigment granules can be seen in the region of the pore, while immediately below it is seen a small, circular, faintly granular body.

The next most common element is shown in Figs. 5 and 11 × 800 D.

In Fig. 5 the element is intact, and is possibly a resting cyst. The first observed effect of the exhibition of mercury is to cause this cyst to sporulate freely, and finally to bring about the disappearance of all the forms from the blood. Fig. 11 shows some of the contents of a similar element to the above.

Two distinct bodies will be noticed to have escaped, a larger body having an epicyst and an endocyst; within the

latter there is an irregular, quadrilateral nucleus. On the periphery will be seen a smaller oval body, with thick walls and clear interior. This element becomes gradually larger, retains its oval shape, and certain ill-defined structures appear within it.

Of the remaining illustrations, Fig. 8 × 700 D. and Figs. 6 and 7 × 1100 D., I can offer at present no opinion, except to suggest that Fig. 7 possibly represents heteromorphic fission, and that the cup-shaped body is a macronucleus. In Fig. 10 × 800 D. the envelope will be noticed to be broken and displaced, exposing to view a reproductive cyst.

In conclusion, I would like to tender my thanks to the board and staff of the London Lock Hospital for the generous support and aid given to me, and also to my friends Mr. T. P. Beddoes and Mr. G. Hare for much valuable assistance in my work.

THE TREATMENT OF TUBERCULOUS PERITONITIS.

By THOMAS GUTHRIE, M.A., M.B., B.C. (Cantab.), F.R.C.S. (Eng.),
Late House Surgeon to St. Thomas's Hospital.

(*Concluded.*)

Passing now to the more radical surgical measures which may be adopted, it is necessary to consider, in the first instance, simple evacuation of the fluid by laparotomy in the ascitic cases. When there appears to be entire absence of adhesions, the abdomen is opened in the mid-line below the umbilicus and the fluid allowed to run out, which is aided by turning the patient on his side, and "perhaps removing some of it by sponges." (Watson Cheyne.) With regard to the size of the opening which should be made in the peritoneum, opinions differ; some operators consider it sufficient if the incision be large enough to admit one or two fingers, while others maintain that the entire hand should be introduced, the intestinal coils and omentum displaced, and a quantity of air allowed to enter. After this, the abdomen is closed in the ordinary way, and should the fluid re-accumulate later, to any considerable extent, it is again evacuated

After this operation the ascites frequently returns, but the amount of fluid is, in that case, usually small, and tends to rapid re-absorption. It is to be noted, that even when the fluid does return in considerable amount, it rarely does so with such rapidity as to endanger the security of the abdominal wound, the latter having always healed satisfactorily before any strain is put upon it, except in the event of septic infection having taken place. In cases in which, while ascites is the marked feature, some adhesions are present, the abdominal incision is planned according to circumstances, and more than one such incision may be required, if there are large encysted collections of fluid. Again, in these cases, it is customary to break down or divide between ligatures such adhesions as can be easily and safely dealt with.

According to Ebstein and many surgeons at the present

time, such "simple opening is best," without the use of antiseptics, and without washing out or drainage; this is, however, not the universal opinion. The abdominal cavity may be washed out with sterilised water, or normal salt solution, at the body temperature, and this is particularly recommended by Mr. Watson Cheyne for cases in which the fluid is semi-purulent or purulent. Again, boric acid lotion, or creolin, has been used for the same purpose, and carefully sterilised iodoform has been dusted over the peritoneal surfaces, or iodoform emulsion in glycerine introduced, before closing the abdomen. Further, by some it is thought advisable to introduce a Keith's tube, or gauze drain, for a few days. Keetly, in 1890, recommended the employment of a skein of iodoform silk dipped in perchloride of mercury solution. As, however the establishment of drainage frequently leads to the development of a tuberculous sinus, Mr. Watson Cheyne would limit its use to those cases in which the fluid is infected with pyogenic organisms. Most authorities agree that glands, or other organs found to be involved, should be removed; according to Dr. Allchin, "Fallopian tubes or glands much affected can be removed without increasing the gravity of the operation." Again, Treves points out that, when there is marked involvement of the glands, the peritonæum is often little affected, and glandular tumours may frequently be removed with advantage. There is, however, a general consensus of opinion that the scope of the operation should be thus extended, only when the case is an early one, and the patient in good condition. In advanced cases, it would be difficult and dangerous, and, apart from this, would be often contra-indicated by the enfeebled condition of the patient. Lastly, Porter (*Journal of the American Medical Association*, September 13, 1902) lays much stress on the importance of the curative effect of air and light in the operative treatment of tuberculous peritonitis. He advises that the abdominal cavity should be freely exposed to light and air for several (ten to fifteen) minutes, and that the light employed should be the strongest available.

Such operations as that for intestinal obstruction and for fæcal fistula will not be described in this place; since they do not come under the same category as those just referred to, and are not undertaken with a view to combating the

disease itself, but for the relief of symptoms incidental to its course.

The following four cases may now be cited as instances of favourable results following the employment of surgical measures:—*Case* 1, a little girl aged 3 years, was apparently well until 14 days before admission to St. Thomas's Hospital, when some abdominal pain was complained of, and the abdomen was noticed to be increasing in size. On admission, the abdominal distension was well marked, there being also some degree of umbilical hernia. Examination showed the presence of a large amount of free fluid with no masses. Six days after admission, the abdomen was opened in the mid-line below the umbilicus, and 16 ounces of fluid, containing a large quantity of albumin, were evacuated; tubercle bacilli were found in the fluid. Subsequently to the operation, ol. morrhuæ was administered, and, apart from some slight suppuration about the abdominal wound, the case made an uninterrupted recovery, no re-accumulation of fluid taking place.

Case 2.—F. C., a girl aged 7 years, gave a history of occasional abdominal pain and diarrhœa, with gradual distension during a period of 15 months. On admission, the physical signs of free fluid were well marked, and no masses were to be felt; there was some bronchitis, with a doubtful early tuberculous lesion of the right lung apex, and some enlargement of the lymphatic glands of both axillæ. The treatment was at first medical, ol. morrhuæ and syrup. ferri phosphatis co. being administered. To begin with, the fluid decreased in amount, but as it re-accumulated later, and the disease showed signs of advancing, it was determined to have recourse to surgical measures. Accordingly, about one month after admission, the abdomen was opened, and a large amount of clear effusion let out; no masses or adhesions were found. After this, the child remained in hospital for a month, during which rapid improvement in the general health took place; no return of fluid occurred, and on discharge the abdomen appeared normal.

Case 3.—A. S., a boy aged 8 years, had suffered from slight abdominal pain at intervals for one year. Six days before admission, some abdominal swelling was observed, and the patient complained of feeling chilly, and did not appear

well. On admission, the belly was much distended with some bulging of the flanks; it was tender, but no thrill or other sign of fluid was made out. Treatment was begun with the inunction, twice daily, of a drachm each of the unguentum iodoformi and ol. morrhuæ to the surface of the abdomen, while internally a mixture, containing a quarter of a grain of iodoform and half a minim of creosote to each dose, was administered twice a day. As no improvement took place after a month of such treatment, a laparotomy was done; much matting of the intestines was found, but no fluid; and numerous adhesions were broken down before closure of the abdomen. The wound healed well, and the patient went out, greatly benefited, three weeks later.

Case 4.—H. R., a girl 14 years of age, had suffered for seven weeks from abdominal pain and vomiting, with diarrhœa and, occasionally, troublesome constipation. On admission, there was some effusion in both pleural sacs; the abdomen was somewhat distended, a slight fluid thrill could be detected, but there was no shifting dulness; the note on percussion was everywhere much impaired, with patches of absolute dulness, and some irregular masses could be felt. On the fifth day after admission, laparotomy was performed. Very considerable matting of the coils of gut was found, together with encysted collections of thick, non-offensive purulent material, and a few caseating glands. The collections of purulent fluid were evacuated, and the abdomen washed out with normal salt solution. Three weeks later, some re-accumulation of fluid had taken place, and the wound was discharging thin tuberculous "pus." A month later, however, the wound had healed well, and the condition of the abdomen was much improved, the patient being discharged very much relieved.

Of these four cases, the disease in the first two was of the ascitic variety, while, in the second, it was of the fibrous and in the third of the caseous type; they, therefore, form examples of the beneficial results which may follow surgical procedures in each of the three varieties in which the affection presents itself.

It must be admitted that, so far from the surgical treatment of tuberculous peritonitis being founded on the generally

accepted facts of pathology, no universally applicable explanation of the good results following its employment has yet been put forward. It is well known that, contrary to the older view, the peritoneum possesses very considerable anti-bacterial properties; and if this be borne in mind, together with the undoubted fact that, in the great majority of instances, tuberculous peritonitis is a very chronic disease, it may be safely assumed that the bacilli, to which the affection is due, are of low vitality, and are, consequently, very apt to be affected by slight disturbances in the conditions under which they live. "Apparently a very slight change in the environment of the pathogenic organism is sufficient to arrest, or nullify, its activities, and lead to its disappearance" (Watson Cheyne). Bumm and others have demonstrated that, after laparotomy, the nodules undergo round-cell infiltration and cicatrisation, with disappearance of epithelioid and giant-cell elements, and Kischenski has confirmed this by experiments on guinea-pigs. Many theories have been devised with a view to explaining this phenomenon. On the presumption that stretching, or over-distension, by the fluid must lead to a lowering of the vitality of the peritoneal envelope itself, it has been supposed that mere removal of the offending agent might enable the membrane to regain its normal "tone," and so deal effectively with the not very virulent bacilli. Again, it has been suggested that the admission of air, or light, may possibly have some mysterious effect in bringing about a cure; it is well known that both of them have a marked effect on the vitality of the tubercle bacilli, but it is, to say the least, difficult to imagine how either could have any influence in this instance, when it is considered how short is the time during which they are allowed to act, and how small a part of the affected surface can possibly be submitted to their action.

Further, the view has been advanced that, at the operation, putrefactive bacteria are introduced, whereby tox-albumins are manufactured from the blood, which are inimical to the tubercle bacilli, a suggestion not very acceptable to the surgeon who has confidence in his aseptic technique.

On the assumption that the fluid is a favourable culture medium for the tubercle bacilli, it has been thought that its removal would impair the vitality of the latter; this explanation

however, will hardly stand in view of the fact that it is in the tissues, and not in the fluid, that the bacilli are growing to any considerable extent.

Perhaps the most reasonable solution that has been put forward is that, on the removal of the fluid, serum having anti-bacterial properties is poured out, and that this brings about the arrest of the morbid processes. It is to be noted, however, that this is purely hypothetical, and is quite unsupported by anything in the nature of experimental evidence. As a matter of fact, as König says at the end of of his article, "Wir stehen vor einem Räthsel"—"The whole thing is a riddle"; and it must remain so, until further work has been done on the subject.

In connection with the question of the *modus operandi* of the surgical treatment of peritoneal tubercle, it is of some interest to enquire in what vital point so simple an operation as evacuation of the fluid without washing out, the establishment of drainage, or the removal of diseased structures, differs from ordinary aspiration. Yet, while there appears to be no doubt that the former is of considerable value in properly selected cases, there is almost universal agreement that the latter is, if not quite useless, at any rate vastly inferior. It is true that light, air, and putrefactive organisms are, or may be, admitted when laparotomy is performed, while they are not, when aspiration is done; but, as has been remarked, it is scarcely possible to conceive that such could be responsible for the success which attends the former method. Possibly, when the fluid is loculated, and the adhesions which confine it are broken down at the operation, some of the superior advantages of laparotomy may be attributable to this procedure; but in those purely ascitic forms, in which the fluid is entirely free in the peritoneal sac, it is very difficult to imagine in what essential point one method differs from the other. Unfortunately, there is an absence of statistics bearing on the relative value of aspiration, and possibly it might with advantage be resorted to more frequently than is at present the case. In discussing the radical treatment of the ascitic cases, Guthrie advises the adoption of aspiration in some of them; he adds, however, that this treatment may be ineffectual, and a subsequent resort to laparotomy may be

necessary. Aspiration possesses the advantage of being a much milder measure, and one well within the scope of the general practitioner.

In a disease such as tuberculous peritonitis, chronic as a rule in its course, and characterised as are the majority of tuberculous affections by a considerable tendency to relapse, statistics of so-called "cures" by operation are bound to be fallacious; if, however, this fact is borne in mind, they may, looked at broadly, be of some value in determining the utility of this mode of treatment. Of 131 cases reported by König, 120 of whom were females and 11 males, and of whom 70 per cent. were over 20 years of age, operation was followed by beneficial results in 107, and of these 84 are recorded as completely cured. Aldibert, in a series of 52 operations on children, obtained 45 recoveries, and nine of these patients were known to be well a year afterwards. In the year 1890, Maurange reported 71 instances of laparotomy for this condition, of which 83 per cent. are described as "successful." Again, in 1895, Roersch recorded 358 cases similarly treated, of which 250 (or 70 per cent.) "completely recovered." Mr. Watson Cheyne, however, considers this percentage too high, and states that, as a result of his own experience, improvement takes place in 50 per cent. of the cases. He lays stress, however, upon the rapid improvement that frequently occurs after operation. He says:—"I must confess that I have been surprised at the recovery of some of these cases. On opening the abdomen, one finds tubercles everywhere, the intestines protrude from the wound, and are seen to be red, inflamed, and covered with tubercles, some of them sometimes of considerable size, the abdominal cavity feels like a bag of rice; and yet, in these cases, recovery may follow." It is to be remembered that the degree of success, obtained by any one operator, depends very largely upon where he draws the line in the selection of his cases. Taking the three varieties of the disease together, Treves estimates that 20 per cent. of all cases operated on have ended in complete cure; he considers, further, that, if the ascitic form be taken alone, this favourable result has followed in 35 per cent. of the cases.

It is well known that the cure of one tuberculous lesion may result in a marked improvement in others, and Mr. Edmund

Owen draws attention to the fact that the retrogression of the peritoneal disease which follows laparotomy may result in improvement, and even cure, in tuberculous processes in other parts of the body.

Some comparison may now be made of the results obtained by "surgical" with those which attend "medical" treatment of the disease. As has been said, Treves estimates that about 20 per cent. of all cases operated on have ended in complete cure; while of all cases dealt with on medical lines, he states that cure has taken place in 9·5 per cent., improvement in 71·5 per cent., and death in 19 per cent. These results are decidedly in favour of the treatment by operation. On the other hand, Dr. H. P. Hawkins, from an examination of 100 cases, came to the conclusion that there is but little difference in mortality, whether operation is resorted to or not; any difference there is being in favour of operation.

The writer finds that 41 cases, admitted to St. Thomas's Hospital during the three years 1900–1902, inclusive, show the following results:—

Symptomatic and Drug Treatment.		*Laparotomy.*	
Cure	12	Cure	7
Relief	11	Relief	6
Death	1	Death	4
Total	24	Total	17

It is true that, in two or three of these cases, recourse was had to laparotomy after the failure of treatment on medical lines, but even with this reservation it can hardly be maintained that, in this series, surgical intervention was attended by any very striking measure of success. Further, out of 27 cases reported by G. A. Sutherland (*Arch. Pediatrics*, February 1903), which were treated medically, 22 (81·3 per cent.) recovered, 1 was unrelieved, and 4 died; while of 14 cases treated surgically, 7 (50 per cent.) recovered, and 7 died. Nineteen of the cases recorded as "recoveries" had been kept under observation for more than a year.

In considering this question, it is necessary to remember, in the first place, that the disease presents itself in, at least, three fairly distinct forms, for all of which it is scarcely to be

expected that one line of treatment would be equally satisfactory; and, in the second, that each individual case must be considered entirely on its merits, so that, while it may be possible to indicate roughly the general methods which are applicable to each variety of the disease, the treatment of specific examples of the affection may require to be greatly modified by such considerations as the existence of advanced tuberculous lesions elsewhere, the age and general health of the patient, and the duration of the disease.

In regard, first of all, to those cases in which ascites is the prominent feature, it has been said that "undoubtedly the most promising cases are those in which there is effusion, whether serous, sero-purulent, or purulent, free or encysted; and in such cases laparotomy may almost be regarded as the only treatment" (Allchin). Again, Professor Howard Marsh advises that "fluid, whether general or encysted, should be evacuated at once. Even when it is purulent, recovery may be uninterrupted." Further Mr. D'Arcy Power lays stress on the importance of the early evacuation of fluid, pointing out that, in some cases, the fluid is very easily coagulable, and so is likely, if left, to lead to the formation of adhesions. How much importance is to be attached to the latter consideration, it is very difficult to estimate, but certainly the above opinions regarding the necessity, or advisability, of an early resort to operative measures, would not be subscribed to by a considerable number of the authorities on the subject. It must be admitted, as Dr. Fredk. Taylor remarked, that "some cases get well without operation," and that, therefore, cases have been and are operated on which might have got well without resort to such radical measures. Further, Professor Thoma observes that, though laparotomy is "no doubt the best and quickest of all methods for dealing with these cases (the ascitic), it is nevertheless always a serious operation, and one also which not every medical practitioner is competent to perform."

There would seem, at the present day, to be a growing tendency to attribute the beneficial results, which often follow laparotomy, rather to the improved diet, general hygiene, and change of air which usually form part of the treatment, than to any special virtue in the operation itself. Dr. G. F. Still (THE PRACTITIONER, December 1903) says:—"There can be

little doubt that the exaggerated value, which has been put upon laparotomy as a treatment for uncomplicated tubercular peritonitis, is due largely to the fact that the tendency of this disease to spontaneous recovery, under favourable hygienic conditions has been ignored." While admitting the general truth of this statement, it cannot be denied that some cases, which have resisted prolonged medical treatment, have yielded in the end to abdominal section.

On the whole, perhaps the most reasonable standpoint to adopt in regard to this question is that the "medical" and "surgical" lines of treatment are each suited to a certain stage of the disease, and that the time-element is a matter of much importance, in connection with the choice of the therapeutic measures to be adopted in dealing with any given case of tuberculous peritonitis in its ascitic form. In regard to this Mr. Watson Cheyne writes :—"There is, however, this distinction between the medical and surgical treatment, viz., that medical treatment cannot be begun too early, whereas surgical may be." In point of fact, the earlier in the course of the disease the operation is done, the greater tendency does there appear to be for the fluid to re-accumulate, and the *status quo ante* to be established.

It may, therefore, be laid down as a good working rule that every case of this variety of the disease should, in the first place, be treated by such general and special medicinal and hygienic measures as have been indicated ; and that if, after a period of 3 or 4 weeks in the more acute cases, and 6 or 7 in the more chronic, well-marked improvement does not take place, resort should be had to one of the forms of surgical treatment. As a general rule, the longer the disease has endured, the less amenable is it likely to be to medicinal treatment, and the clearer will be the indications for laparotomy. Lastly, there must always be borne in mind the importance of not allowing the patient to go too far downhill before operating.

As regards the best form of surgical procedure to adopt, it seems very probable that nothing is gained by the introduction of such substances as iodoform into the peritoneal cavity, or by the establishment of drainage, while the latter is objectionable (excepting in those cases in which the fluid

is purulent and is infected with pyogenic organisms), on account of its tendency to lead to the formation of a tuberculous sinus. In all ordinary ascitic cases, in which it has been decided to operate, an incision 2 or 3 inches long should be made, and the fluid evacuated, as completely as possible, without undue handling of the abdominal contents, such as might increase the risk of shock or sepsis. Any adhesions which can be easily dealt with may be broken down or divided between ligatures, and any accessible localised collections of fluid evacuated; while, if the case is an early one, and the patient robust, breaking-down lymph glands, or much infected Fallopian tubes, may be removed. During the subsequent treatment, the patient must get all the benefit of such hygienic measures as the fresh air and good feeding, indicated in discussing the medicinal treatment of the disease.

Phthisis does not seem a bar to operation, which, when not accompanied by excision of portions of abdominal contents, is not accompanied by much shock. The condition of the lungs often improves, *pari passu*, with the local condition, in cases benefited by operation.

Reference has been made to aspiration as an alternative to laparotomy. It is not probable that much reliance can be placed upon it as a routine measure, but it may be of value in cases in which drug treatment has failed, and in which, for some reason or other, there is an insuperable objection to the major operation.

What has been said, in regard to the line of treatment to be adopted in dealing with this form of the disease, does not apply to those somewhat uncommon cases in which the onset is very acute, resembling septic peritonitis or internal strangulation, and in which the fluid is usually hæmorrhagic or purulent. These cases are very unpromising, and are probably best dealt with exactly as acute septic peritonitis, that is, by immediate operation, with a large incision, followed by thorough washing out with normal saline solution and efficient drainage.

The question of surgical intervention in the fibrous or adhesive form of the disease is less difficult to determine than in the chronic ascitic variety; though even here there is some difference of opinion. According to some writers, operation in this form is "useless or worse than useless"; while Professo

Howard Marsh holds that "in the plastic, or dry form, no operation (unless for obstruction) should be done; as from this patients recover under medical treatment alone." Mr. Watson Cheyne, on the other hand, states that he has, as a result of operation, "had success in the dry form as well as in the ascitic." He urges, further, that "all, even the gravest forms, show good results, and there is no form in which we can say that laparotomy is absolutely useless, ... all types improve after it." It may, perhaps, be laid down that medical treatment should be adopted in all cases of this type, and that laparotomy should only be undertaken as a last resource, when the signs and symptoms point to a constantly progressive lesion; the abdominal cavity should then be opened and irrigated as thoroughly as the state of affairs will allow, being subsequently closed without the establishment of drainage. In the event of intestinal obstruction, some degree of which is very common in these cases, becoming acute, abdominal section must, of course, be undertaken for its relief. In these cases, re-section of a portion of the bowel is seldom possible, and, as a rule, anastomosis will be the method adopted, or, failing that, the establishment of a temporary fæcal fistula. As pointed out by Mr. Mayo Robson, it is sometimes good practice to perform anastomosis early in the case, and quite apart from symptoms of acute obstruction, as by this means the patient may be saved much discomfort, and rest is given to that portion of the bowel which is principally affected.

As regards the treatment by Surgery of the third and last type of the disease, the Caseous or Ulcerous, there is little to be said. Even Mr. Watson Cheyne, who holds that there is no form in which laparotomy is absolutely useless, would adopt it in the caseating variety "only as a last resort"; the tendency to the subsequent formation of a fæcal fistula is very great, and this may result even without apparent injury to the gut. The treatment, therefore, must be chiefly directed to supporting, and, if possible, improving the general health, and to the relief of symptoms. If operation is undertaken in cases of this variety, no attempt must be made to eradicate the disease; but the abscess cavities should be dealt with, as are tuberculous deposits elsewhere, by evacuation and careful swabbing out of the cavities, followed by the introduction of

iodoform emulsion and suture. As a general rule, the treatment will be conducted on "Medical" lines, and such special measures as the use of mercurial or iodoform inunctions may be tried, though they are probably of but little value in this form of the disease. Operation has sometimes been undertaken for fæcal fistula, but it is very hopeless in these cases.

The scheme of treatment of the fibrous and the caseous varieties above outlined is very similar to that summed up by Aldibert in his monograph, *De la laparotomie dans la péritonite tuberculeuse chez l'enfant.* He says, "Operation is contra-indicated in the fibrous form, not attended by pain, this usually tending to spontaneous recovery; in the dry ulcerative form, except at the outset; and in the suppurative form with multilocular cysts. The existence of other foci of tuberculosis does not contra-indicate operation, except when these are chiefly intestinal, or when there is general tuberculosis with extensive and rapidly progressing lesions."

The improvement, which recent years have seen, in the prognosis of tuberculous peritonitis has come about, *pari passu*, with the development of its surgical treatment, and there can be little doubt that the employment of laparotomy must be credited with some share in this improvement. If, however, the disease is a less fatal one to-day than it was a generation ago, the change must mainly be ascribed to those causes, which have so greatly improved the outlook in tuberculous disease in general.

I am much indebted to the staff of St. Thomas's Hospital for their kindness in allowing me to make use of the cases referred to in this article.

NECROBIOTIC FIBROIDS AND PREGNANCY.

By FRANK E. TAYLOR, M.A., M.B., M.Sc., F.R.C.S., M.R.C.P
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Of all the degenerative changes which uterine fibroids are liable to undergo, none gives rise to appearances so striking and characteristic as those produced by that form of necrosis known as aseptic necrobiosis or red degeneration.

As a result of this process, a hard, pearly-white, whorled, odourless fibromyoma is transformed into a soft fleshy mass, deep reddish-brown or mahogany in colour, and of a stale fish-like odour, reminiscent of the amines. In a well-marked example, the cut surface of the tumour presents a homogeneous deep red colour, having quite lost its characteristic whorling. This appearance has suggested to the minds of various observers a resemblance to liver, or to raw beefsteak, and this latter resemblance is still further enhanced by the fact that the freshly-cut surface tends to become darker on exposure, whilst the original colour, retained by the deeper parts, is readily restored to those parts when a fresh section is made. In less marked cases, the periphery of the tumour may have escaped the degenerative process; it will then retain its original white whorled appearance, and the central portion only will show this red degeneration, whilst, in still slighter cases, only a light red or pink staining of the tissues of the fibroid is observable.

In the most advanced cases, on the other hand, the central parts of the tumour may soften and break down into a brownish red mucoid fluid, or a red pulp. This condition is well seen in the accompanying illustration (Fig. 1). It may readily be conceived that this pulpy fluid may become absorbed, and the peripheral portions of the tumour may then undergo similar softening and absorption, leading to the ultimate absorption and complete disappearance of the whole fibromyomatous tumour.

The necrotic change is thus seen to commence in the central portions of the tumour, where it is always most

marked. Here it may commence either as irregular streaks, or as scattered isolated rounded foci, or as a uniform pinkish staining.

It has been surmised that the flesh-like redness and soft consistence of necrobiotic fibroids are due to the presence

Fig. 1. *Gravid uterus deformed by necrobiotic fibroids, one of which was diffluent. Removed from a woman, aged 28, on account of pain, impaction, and rotation of the uterus. The arrow lies in the cervical canal.*

of an increased amount of muscular tissue, or to its engorgement with blood, presumably extravasated. Microscopical examination of sections of the growths shows, however, neither an increase in the muscle, nor engorgement with blood, nor hæmorrhagic extravasation. The condition is seen to be a degenerative change, since there is "a marked deficiency in the nuclear staining of the tissue cells, and in the more advanced cases this had resulted in an almost total absence

of nuclei in the section, leaving only wavy bundles of fibres which had taken up the ground stain. In places where the nuclei have taken up the stain, they appear much more faint than usual, and fully merit the title of 'nuclear ghosts.' In some cases the muscle bundles showed signs of granular or hyaline change." (Fairbairn.[1])

Of late much attention has been bestowed upon this condition. It is not by any means a rare one, for, as I have recently shown,[2] it occurs in about six per cent. of all fibroids submitted to operation.

The ætiology of this condition is a matter of great uncertainty. It is probably due to some nutritional disturbance of the tissues of the fibroid, towards which pregnancy may exert a predisposing factor, as its frequent association with pregnancy has been insisted upon by the majority of writers on the subject. Thus, Dr. Fairbairn[3] considers that "pregnancy, quite apart from the accidents of labour, or the puerperium, has some influence in the causation of this necrotic process." Mr. Bland-Sutton[4] has also drawn attention to the frequent occurrence of this change during pregnancy, and states that "a careful study of a number of fibroids obtained from gravid uteri shows that, under these conditions, fibroids are very prone to undergo degenerative changes, and are especially liable to soften. The peculiar alteration in colour is another feature, which, in my observations, has been entirely confined to fibroids complicating pregnancy. The common colour of a fibroid is a dirty white, or a very pale yellow; in many degenerating fibroids the yellow deepens. In pregnancy the fibroid usually assumes a deep red, or mahogany tint. In the early stages the tumour exhibits this colour in streaks, but as pregnancy advances the whole tumour becomes affected." In a subsequent essay he confesses that "until Fairbairn began to accumulate the material for his paper, I held the opinion that this change was only seen in association with pregnancy, but he soon convinced me that it occurred in spinsters, and I have myself seen since well-marked examples in women who have never been pregnant. At the same time it must be stated that the largest number, the best marked, so far as colour goes, and the most extreme examples of this red degeneration occur in association with pregnancy."

During my tenure of the office of Pathologist to the Chelsea Hospital for Women for the last three years, I have examined fifteen necrobiotic fibroids, and have investigated their relationship to pregnancy. In only two of this number were these conditions associated. These cases are recorded *in extenso* below.

In no case was there a history of recent delivery. Six of the patients, three spinsters and three married women, had never been pregnant at any time. The remaining seven had collectively borne 21 children, and had had 9 miscarriages, and of this number, one patient, a woman of 43, had contributed 11 children and 2 miscarriages. The intervals which had elapsed, since the termination of the last pregnancy in the remaining 7 cases, varied from 15 months to 16 years, with an average of just over 6 years.

These figures, although dealing with too small numbers to be of any great value for statistical purposes, tend to show that pregnancy is not an ætiological factor of prime importance in the production of necrobiotic degeneration of uterine fibroids.

Nevertheless, when associated, these two conditions form a very striking picture, and the following cases prove that it is a matter of clinical, as well as of pathological, importance.

Case 1.—A woman, aged 33, was admitted into Chelsea Hospital for Women under the care of Mr. Bland-Sutton on February 28, 1905. She complained of severe pain in the lower abdomen for the last three days, which for a few days previously had been preceded by a dull ache.

Menstruation commenced at the age of twelve. It was always regular, but variable in amount, until October, 1904. The last period commenced on October 29. Since then there has been complete amenorrhœa, though there had been an abundant leucorrhœal discharge.

A month ago, on getting into bed, the patient had felt a "rick" inside, and since then some soreness had existed in the lower abdomen. This became aggravated, so as to be actually painful on February 22, and by February 26—two days before admission—the pain had become extremely severe.

On examination of the chest, the heart's impulse was felt in the sixth space, 1½ inches external to the nipple-line.

A systolic murmur was heard at the apex, and was transmitted into the axilla. The lungs were normal.

Abdominal examination revealed a full, tense tympanitic abdomen. A tumour, as big as a child's head, was felt in the left iliac region and in the left loin. It was tender and immovable. It was dull on percussion, except in the loin, where it was semi-resonant. Another tumour, soft and ill-defined, could be felt mesially placed in the hypogastric region, reaching up to a line midway between the symphysis pubis and the umbilicus. This was the pregnant uterus.

On vaginal examination, the cervix was felt high up on the left. It was softened. The body of the uterus was pulled up out of reach. The breasts showed signs of activity, and secretion could be expressed from them.

On the evening of the day of admission, the patient aborted. A well-formed fœtus, $7\frac{1}{2}$ inches in length, was passed along with its membranes.

The tumour in the left iliac region was still present, its character and relations being unchanged.

Seven days later, on March 6, Mr. Bland-Sutton removed the uterus by abdominal hysterectomy. Recovery was rapid and uneventful, and the patient was discharged from hospital on March 27.

The specimen removed was shown by me at the meeting of the Obstetrical Society of London on October 4, 1905. It consisted of the body of an enlarged uterus, the right cornu of which contained a globular fibromyoma, 4 inches in diameter. The tumour was solitary and interstitial. When fresh it was soft in consistence and of a bright mahogany-red colour, and of a peculiar fish-like odour.

On the right posterior aspect of the inner wall of the uterus was a rounded, slightly elevated, roughened area, forming the placental site.

Microscopic examination of this necrobiotic fibromyoma showed a very marked deficiency in the nuclear staining of the tissue-cells, which resulted in an almost total absence of nuclei in the sections, leaving only wavy bundles of fibrous tissue which have taken up the stain.

The chief interest of this specimen consists in the fact that, in one and the same uterus, are seen: (1) evidence of

recent pregnancy, viz., the placental site, and (2) a fibro-myomatous tumour undergoing aseptic necrobiosis, or red degeneration.

Case 2.—Mr. Bland-Sutton [5] showed the specimen from this case at the Obstetrical Society of London on June 1, 1904, and reported on it as follows :—"Mrs. F ——, aged 33 years, was placed under my care by Mr. L. Beer on account of an abdominal tumour complicated with pregnancy. The patient, who had been married a few months, ceased to menstruate on October 27, 1903. She considered herself to be pregnant, but her peace of mind was disturbed by a rounded tumour as big as a man's fist, which had become markedly prominent in the neighbourhood of the umbilicus. Examination satisfied me that this lump was a fibroid in the anterior wall of a gravid uterus, but the pelvis also contained a large rounded elastic swelling, and, as the cervix uteri was flattened against the pubes, it caused some difficulty to determine whether the globular body in the true pelvis represented the fundus of a gravid uterus, or another fibroid incarcerated by the uterus. As there were no symptoms of urgency, or interference with the urinary organs, it seemed judicious to keep the patient under observation, especially as she was anxious to have a living child. She reported herself at intervals, and the uterus rose in the abdomen, but the pelvic mass remained unaltered. On May 9, the patient came to the hospital in great pain and distress. On examination she was found to be in labour, with the arm of the fœtus protruding through the mouth of the womb. Dr. Eden kindly saw the patient, and decided that an operation was urgently indicated, as the pelvic tumour absolutely obstructed the transit of the fœtus, and that it was dead. After the patient's abdomen had been rendered as aseptic as the urgency of the case allowed, I exposed the uterus through a free abdominal incision and performed total hysterectomy, removing the uterus and its neck, with the tumours, fœtus, placenta, ovaries, and tubes intact. . . . During the enucleation of the cervix, I was a little puzzled to determine where the cervix ended, and the vagina began, as the parts were soft and œdematous, but subsequent examination of the parts showed that the whole cervix was removed. The specimen, as displayed in the drawing (Fig. 2),

shows the uterus divided in a sagittal direction; an interstitial fibroid occupies its anterior wall near the fundus; it is of the colour of mahogany. The larger fibroid grew from the

Fig. 2. *A gravid uterus in sagittal section removed from a primipara, aged* 34 *years. The patient miscarried at the seventh month, and the arm presented. Delivery being impossible on account of a large cervical fibroid, the uterus, with its tumours, contents, and cervix, was removed by panhysterectomy. The smaller fibroid in the body of the uterus is necrobiotic.*

posterior aspect of the cervix, and almost completely occupied the cavity of the true pelvis. This tumour was soft and in colour like wet wash-leather. It would be tedious to attempt a description of the extraordinarily contorted condition of the fœtus, but this is faithfully displayed in Fig. 2, as well as the œdema of the presenting arm."

The chief interest in this case consists in the dystocia, caused by the obstruction of the pelvis by the large cervical fibroid, which was soft and œdematous, whilst the smaller necrobiotic fibroid in the anterior wall was possessed of no interest, except the fact that it was undergoing red degeneration. It shows, however, that in a uterus, occupied by multiple fibroids, some of the tumours may undergo necrobiosis, whilst others escape, whereas, if pregnancy were the real determining cause of this degeneration, we should expect that all the fibroids present would be affected in this manner.

Mr. Bland-Sutton has recorded several other cases. In one of these, a woman, aged 28, sought advice for an abdominal swelling, which had recently become much larger and painful. There had been amenorrhœa for three months. A hard, rounded swelling, the size of the fist, occupied the right iliac fossa ; a larger rounded tumour could be felt impacted in the pelvis. The tumour was tender to pressure. The abdomen was opened, and a large tumour in the anterior wall of the uterus was found impacted in the pelvis, the body of the gravid uterus occupied the hypogastrium, and a tumour in the posterior wall of the uterus was lodged in the right iliac fossa, so that the uterus was rotated though 90°, and also acutely flexed. The uterus, after hardening, was divided sagittally. The fibroids exhibited irregular red streaks, which were most marked in the largest tumour, the central part of which was soft and diffluent. The pregnancy had advanced beyond the third month. In another case, recorded by the same observer, a woman, aged 34, when advanced to the sixth month of pregnancy, suddenly felt acute pain in the abdomen. On undressing and examining herself she found a lump in the right iliac fossa. She was admitted into Chelsea Hospital for Women two days later. A rounded, smooth, exquisitely tender tumour, closely attached to the uterus, was found. The temperature reached 100°. The swelling was thought to be an ovarian tumour with

a twisted pedicle. At operation it was found to be a subserous fibroid, sessile on a gravid uterus. Its removal offered no difficulty ; the patient recovered, and the pregnancy went to term. After removal the tumour was bisected, and a quantity of red fluid escaped. The solid parts of the tumour had a dull red-mahogany tint throughout.

Another case is that of a married woman, aged 36. For some months there had been enlargement in the hypogastrium. For two months, there had been amenorrhœa. On examination a large fibroid was found springing from the anterior wall of the uterus, bulging into the hypogastrium, compressing the bladder, and producing pain. The signs of pregnancy were indefinite. A large fibroid was removed by abdominal myomectomy from the anterior aspect of the cervix. The uterus was somewhat enlarged and softened. It was not removed. The fibroid, on section, presented a uniform mahogany colour, but showed no traces of softening. Seven and a half months later, the patient became the happy mother of a fine boy. The uterine enlargement and the red degeneration of the fibroid were thus both due to a pregnancy of six weeks' duration.

The foregoing cases are all examples in which the necrobiotic fibroid has been found during the course of pregnancy. I have not met with a case occurring in the puerperium, or in association with recent pregnancy, but the following cases by Fairbairn,[6] Bland-Sutton,[7] and Doran and Williamson,[8] respectively, show this association :—

In Dr. Fairbairn's case, a woman, aged 22, who had been married 13 months was delivered of her first child on March 10th. During the later months of pregnancy, she suffered from pain shooting from the right side down to the vulva, but no abdominal tumour was discovered. Labour was not protracted, but delivery was completed by forceps as the patient showed some signs of exhaustion. The puerperium was normal until the fifth day, when the temperature began to rise, and remained from 100° to 102° for four weeks until admission into hospital. A tender swelling was first noticed on the sixth day. Abdominal section revealed a tumour of hour-glass shape, growing from the right side of the uterus, and invading the right broad ligament, the constriction being at the place where the tumour invaded the broad ligament.

Supravaginal amputation was performed. Recovery was interrupted by an attack of intestinal obstruction, due to constriction of bowel by a piece of omentum adherent to the stump, which necessitated the re-opening of the abdomen. The tumour removed weighed 1 lb. 9½ ozs. It was soft, and showed throughout, on section, the fleshy-red raw beefsteak appearance, as well as the microscopic appearances, characteristic of this form of necrosis.

In Mr. Bland-Sutton's case, the patient was a married woman, aged 36. In 1896, she had given birth to a healthy child. In 1898, a fibroid the size of a turkey's egg was discovered. In 1900, she again became pregnant, and was delivered in July 1901. A few days after the birth of the child, the fibroid became tender, and irregular losses of blood occurred which were so profuse as to be alarming. The patient was now profoundly anæmic, and had a tumour, the size of a cricket ball, very tender, freely movable, but sessile, in a puerperal uterus. Abdominal hysterectomy was performed with success. The fibroid, on section, was the colour of mahogany throughout; its central parts and the segment of its circumference in relation with the uterine cavity were soft and diffluent, and bacteriological examination yielded negative results.

In Mr. Doran and Dr. Williamson's case, a woman, aged 38, had noticed swelling of the abdomen for over one year, and the period had been absent for four months. The abdominal distension was due to a slightly bilobed tumour, of which the right portion, which was very instant, nearly touched the ribs, and the left portion, which fluctuated, reached the left hypochondrium. Exploratory laparotomy was performed. The fœtus was felt in the left mass. The character of the tumour was not definitely ascertained, and, as it would not impede delivery, it was left untouched. Three and a half months later, the patient was spontaneously delivered of a healthy male child. During the puerperium, the tumour was noticed to be tender, and one night the patient had a violent attack of pain in the epigastrium, the symptoms simulating those caused by axial rotation of an ovarian cyst, the temperature reaching 101°. The tumour was found to be a large, solitary, interstitial fibromyoma of the anterior wall of the

uterus, red and fleshy looking, and presenting the histological structure characteristic of necrobiosis.

Stouffs of Brussels has also reported a case of necrobiotic fibroid removed shortly after pregnancy.

It would seem, then, that in all these cases pregnancy, or the puerperium had initiated the degenerative changes, which eventuated in the transformation of the fibromyomatous tumour into the soft red mass characteristic of aseptic necrobiosis.

For the illustrations accompanying this paper I am indebted to the kindness of Mr. Bland-Sutton.

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THE AFTER-TREATMENT OF CASES OF SUPRAPUBIC CYSTOTOMY.[1]

By G. H. COLT, M.A., M.B.,

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Mr. President and Gentlemen,

The after-treatment of cases of suprapubic cystotomy is a difficult subject and varies, to some extent, with the purpose for which the operation has been performed. At the outset there are two main classes of cases to consider, the first in which the bladder is opened for the purpose of diagnosis or for the removal of disease, and the second in which it is opened for purposes of drainage either as a curative or as a palliative measure. In the first class the object of the after-treatment is primarily to secure the closure of the wound as speedily as is consistent with safety, while in the second class this is not always the case. In this class there may be included cases of persistent cystitis in which the cause is not clear, inoperable cases of carcinoma and cases of tuberculous disease of the urogenital tract, of the bladder and prostate in particular. In the latter cases we know from experience that the edges of the suprapubic fistula sometimes themselves become tuberculous and take many months to unite. The treatment of cases in the second class is best considered as a part of the subject of cystitis and will not be mentioned here except to show how the uncomfortable state of the patient may be further alleviated. In cases in which strangury is frequent, the relief afforded by a permanent urinary fistula is very great indeed.

It is evident that the question of after-treatment really begins at the commencement of the operation with the maintenance of asepsis within the operation area so far as this is possible. If this is done the edges of the skin will, where brought together, have a good chance of healing by first intention and cystitis will be avoided, thereby shortening the

[1] A paper read before the Abernethian Society at St. Bartholomew's Hospital.

period of convalescence. The next point is the method by which the bladder shall be opened, a point which must be dealt with at some length as it bears materially on the after-treatment. An account has been published[1] of a method of opening the bladder in which the incision into it is made, not directly opposite the incision in the abdominal wall, but an inch or more, as retraction and the nature of the operation allow, towards the vesical orifice of the urethra either by an antero-posterior or a lateral route. In nearly all these operations the concluding stage consists in sewing the edges of the bladder above, below, and laterally to the anterior abdominal wall with sutures of catgut which do not pass through the skin. A drainage-tube, the diameter of which is, to some extent, determined by the amount of the hæmorrhage and the quality of the urine, is inserted and the skin incision is closed around it. The best results, as regards the healing of the wound, are obtained when the tube is placed in its lower angle. The tube is fixed to the skin by a suture of silkworm gut, because this facilitates the manipulations later. The suture should only traverse the rubber and should not cross the lumen of the tube. If it crosses the lumen of the tube blood clot lodges against it, access to the bladder is hindered, and air can enter by the stitch holes and prevent siphonage. If the incisions have been made opposite each other there is no sliding of one hole over the other when the drainage-tube is removed; but if they are not opposite each other the tube, if radially situated, actually maintains a state of shearing stress between the holes in the skin and the bladder respectively as it passes from the outside to the centre of the viscus, and when it is removed these holes will slide the one over the other and so help to close the suprapubic exit. The observation which led to this conjecture, and at present it is little else, was this:—A patient had been operated on by Mr. D'Arcy Power for vesical calculus. As the wound was being dressed the patient, whose consciousness was returning, coughed and strained considerably, and it was easy to see that the external part of the drainage-tube was forcibly tilted nearly parallel to the skin and pointing towards the patient's head. I propped the tube back and maintained it in this position with dressings

and bandages until it was removed on the third day. When it was removed no change was immediately visible, but the next day the upper and deeper layers of the wound, namely the wall of the bladder, had slid downwards under the hole in the skin and nearly closed the fistula. This fistula and wound were completely healed in eleven days from the operation and this is an early date in such a case.

The same effect, as regards the method, is of course produced by arranging the position of the hole when suturing the skin so that it is not directly opposite the hole in the bladder. In either case the tube is responsible for keeping the two holes concentric. There is probably more in this principle than meets the eye at first. Although it would be foolish to recommend it on the strength of only one case, yet it would be worth while to give it a fair trial, since no great harm can follow. A glass drainage tube would probably be more efficient than a rubber one, but the force that need be applied is very small. Inasmuch as it is easier to keep the tube straight by bandages from the pelvis than by bandages from the abdomen, the hole in the skin should be higher up than that in the bladder. The tube should also be as low down in the wound in the skin as can be arranged, and if it is actually in the lowermost angle of this wound so much the better, as the skin incision is then less likely to be flooded by urine. Then should the first incision be in the middle line, or should it, as I think advisable, traverse by lateral displacement some of the fibres of the rectus abdominis? When the patient is thin it is often possible to manage this. Again, C. L. Gibson,[2] in 1901, published an account of a method of suturing the wound in the bladder around the tube and inverting the walls of the viscus in such a manner that leakage is prevented while the tube is retained, and when it is removed the mucous membrane comes together as a valve across the hole and this leads to its closing speedily. Unfortunately there is, at present, no further account of the results. It is possible that a combination of these methods would be of value and would result in a speedy yet safe closing of the wound when the drainage-tube is removed, thus saving the patient from a very uncomfortable and wearisome period of convalescence.

In cases in which the urine is not septic and in which hæmorrhage is slight, in fact in those cases in which it is considered safe to close the bladder, it is an obvious advantage to do so; but it may be doubted whether it is ever justifiable to close the wound in the skin in such cases on account of the danger of extravasation of urine, should the bladder leak. The incision in the skin is usually partly closed, a drainage-tube left in the space between the pubic rami and the bladder and a catheter tied in and arranged for continuous drainage. As Keyes[1] remarks, it is unfortunate that one is not dealing with a peritoneal surface; were this the case the results, as regards the absence of leakage, would probably be better. I believe that some surgeons perform a second operation about the sixth day to close the fistula, but I only speak from second-hand information.

The details of the drainage-tube need not be considered at length. It is almost always either a single or a double rubber tube with no lateral holes save in the part inside the bladder. Tubes made for the purpose, with all the edges and corners rounded off and with a permanent curve in them for purposes of siphonage, are probably the best. The choice depends partly on whether an aspiration pump is to be used later on or not. The edges of the wound should fit closely round the tube so as to prevent the entry of air as far as possible.

The wound is dressed and the patient is returned to bed. At this stage surgeons adopt various lines of treatment which differ considerably. While some continue to wash out the bladder twice a day for some weeks, others only do so as long as blood, blood clot and débris appear on the dressings. It seems reasonable to remove all débris as far as possible by this mechanical cleansing, and if cystitis is present the proceeding will also be of value. When the main collection of blood clot and débris has disappeared the tube is connected by a glass union—clear glass is employed in order that the interior of the tube may be seen—to a long rubber tube, which is led to a receptacle beneath the bed. This vessel is generally a transparent glass pail and contains a measured quantity of lotion, beneath the surface of which the tube opens and into which the urine flows. If a two-way tube is used one end is

cut short and the other is left long, though why this is done is not clear. The longer tube is connected with the pail. Some surgeons leave both ends long and connect both with the receptacle. In each case the aim is to establish a siphonage action whereby the urine shall flow over by the tube and shall not leak around it. It is obvious that the slightest leakage of air into the bladder and so into the siphonage system annuls the action completely, unless the bladder remains full of urine or unless the air at the top is at a higher level than the vesical openings of the drainage-tube. These are conditions which are seldom maintained for long, but the arrangement is worth trying because occasionally it works admirably. It has been pointed out to me that siphonage proceeds better if the fall is slight, say two or three inches, and the reason is plain, namely, that this amount of suction is insufficient to draw air past the damp dressings into the bladder and therefore the siphon remains full, a very important matter from the patient's point of view. On the fourth day the edges of the wound no longer fit closely round the tube and air leaks in. The wounds themselves vary, however, and sometimes the growth of granulation tissue which in the one case tends to loosen a previously tightly fitting tube, in the other case actually causes a loosely fitting one to fit better and thereby facilitates the siphonage action. This is, I think, the explanation of the vagaries of the arrangement which are many and various, so that the use of some form of aspiration pump has been found advisable. It is quite impossible to deal with this question at all fully here. There is no connected account, so far as I know, of the best way to employ the aspirator or of the results of its use ; but while some report that the patient's skin is thereby prevented from becoming wet, others say that continuous aspiration is of little use. In this, as in all other matters connected with the surgery of the bladder, attention to detail is essential. Elsworth,[3] has stated that "the labour of nursing and the discomfort of the patient were much relieved by the use of Sprengel's pump, which reduced the necessity of changing the bed to one-twelfth of what it had previously been." E. L. Keyes[5] says "with the double siphon of Guyon, as well as with the self-retaining catheter of Pezzer, it has been impossible

to prevent a great deal of overflow alongside the tube." I understand that at St. Peter's Hospital for Stone they now let all cases drain into the dressings.

As to the length of time the tube is retained. There seems to be a pretty general opinion among the sisters at the various hospitals—and they have opportunities of noticing these matters year in and year out—that the longer the tube is retained the longer does the fistula take to heal. That the tube should be retained for from three to five days until the fistula is established, the bladder fairly clear of débris and the danger of extravasation of urine slight, seems to be admitted by all. If the siphonage system is working well and the edges of the skin incision are not wetted by urine, let the tube, provided it is not relatively too large, be retained for as long a time as it is efficient up to say nine days, so as to give the edges of the wound every chance to heal where they have been sewn together. When the tube is loose it is not worth while to retain it, for the patient is often more inconvenienced than benefited by the careful dressing which may be necessary to enable the siphonage to continue. Personally I quite fail to see any reason for replacing the tube by a smaller and looser one and decreasing the size regularly, as is done sometimes, until it is omitted entirely, except perhaps when an aspirator pump is being used. This will perform its purpose through a very small, single tube with a rosette of holes at its distal end. Such a tube can follow immediately after the one inserted at the operation and will not at first interfere with healing. It should be changed daily if salts are deposited on it. With the aspirator in use the entry of air into the bladder is necessary. If an aspirator pump is not to be used let the drainage-tube at this stage be removed for good, as soon as the fistula is established, provided the siphonage fails. That is to say, let it be removed on the fourth day. If it is retained it gets in the way of the dressings, and drainage occurs just as readily without it as with it. Some will suggest that aspiration is necessary to keep the bladder empty and at rest, but one does not observe the occurrence of vesical tenesmus so long as the fistula is patent. Seal up the fistula and the patient soon begins to strain. Would not aspiration *per urethram*, as suggested eleven years

ago by Cathcart[6] when describing his apparatus, be a convenient solution of many of these difficulties?

About the fourth day the bladder is clear and washing out is usually unnecessary unless there is a special reason for it. It is readily performed through the two-way tube. Perhaps the best cleansing the bladder can have is that performed by the urine itself and the internal administration of urinary antiseptics may be of value. Some of these drugs cause intestinal disturbance; for instance, magnesium borocitrate, in large doses, acts as a saline purge. Urotropin, too, if given in concentrated form, has been followed by hæmaturia. All are best given with a relatively large quantity of water so as to promote diuresis. The dressings have to be frequently changed and should, therefore, be the cheapest that can be obtained. One small piece of plain gauze, a slab of wood wool arranged chiefly at the sides, a piece of absorbent cotton wool in each groin with two strands of bandage are ample. Since Domette bandage washes well it is cheaper than one would expect. Double cyanide gauze often causes pustules on the skin around the fistula, probably because the salt is dissolved and the solution remains continually in contact with the skin. Unmedicated gauze is therefore better. Dried moss compressed into sheets is about one-third the bulk of absorbent wool; but weight for weight the former has no advantage over the latter, although it is said to leak less readily when fully saturated. To cover these patients with a large heap of dressings in the hope of absorbing all the urine is futile because it simply flows round between the skin and the dressing without soaking through the latter. For this reason the use of a sheet of grease-paper, or other kind of waterproof, between the dressing and the bandage is not of great value, although it prevents part of the bandage from getting wet. In the hot weather these patients are often very uncomfortable, and they also seem to feel the cold more than the average patient. Starch or boracic powder rubbed into the skin to keep it dry and prevent pustules is found to be saturated almost directly. Pustules are best treated by removing the cause, which is usually either an antiseptic or irritating urine, and covering the skin well with an ointment which has a relatively high melting point. The

proper treatment is preventive and depends on the exercise of care in shaving the skin, the non-abuse of antiseptics and the treatment of the urine so as to dilute it and alter its character. Hæmorrhage is treated by general methods. Irrigation with a solution of adrenalin 1–40,000, or of the tincture of hammamelis, a drachm to a pint, is useful. Serious hæmorrhage from the bladder in these cases can always be stopped by packing the cavity with gauze.

If the granulations become exuberant they are cauterised with fused silver nitrate. It is not advisable to use the ordinary crayon-holder for the caustic. It is seldom possible to fix the caustic firmly in this without soiling the hands, the after-effects of which are extremely inconvenient and unsightly, and there is some danger of the caustic falling out and even into the bladder. One of the best things to use is an ordinary silver probe, the rounded end of which has been dipped into fused silver nitrate which is on the point of solidifying. Such a probe I have here. The caustic adheres and forms a cylinder with a rounded end, and the whole is infinitely more manageable and safer than the crayon-holder, besides being cheaper, more simple, and a great saving of caustic. The caustic probe, which was I believe originally devised by Barnes for uterine work, can be made of any desired thickness or shape and the caustic is readily renewed by re-dipping. In the case of a small fistula one can safely touch the granulation tissue inside it, and I think it will be found that this often leads to speedy healing. If due care is taken not to injure the growing edge of the epithelium, namely by first drying the granulations, a small fistula which, had it been left alone would perhaps have taken ten days to close, will be healed over in forty-eight hours after this proceeding. This point, however, like the therapeutic action of a drug, is not capable of absolute proof. Gentle cauterisation is astringent and promotes healing, for one sees pale, flabby granulations shrink and become red when thus treated. *Apparent* closing of the fistula sometimes occurs when a small slough, or other piece of débris, becomes lodged in and occludes it. The patient passes urine *per urethram*. When the blockage softens, the fistula becomes patent once more. The statement that urine was passed

naturally many days, perhaps, before it was all passed per urethram is often deceptive, and tends to lead anyone who has not observed these matters to the conclusion that the patient's skin was not again wetted by urine from the fistula until the latter was healed permanently.

The skin sutures are generally loose on the sixth day and may be removed except, perhaps, one or two near the fistula or as experience will suggest at the time. They are of course retained for as long a time as they appear to be of use without causing pain. If severe sloughing occurs in the bladder they are all removed immediately. Many surgeons omit them altogether, and much depends on the nature of the case.

It is evident that there comes a day when, either by reason of the failure of siphonage, or by the removal of the tube, the patient is left with a wound that is healing and in some part of which there is a complete urinary fistula. Sometimes he has a catheter permanently in the bladder and urethra; but, if not, one is generally passed from time to time to insure that the natural opening is patent. If he has no catheter tied in, all his urine passes by the fistula. His dressings and bandages are continually soaked and require to be changed every three hours at least, the draw-sheet being changed at the same time. The urine flows round beneath the dressings to his back and down the scrotum. His skin is always wet from about the level of the third lumbar vertebra to a point four inches down the thigh. He has to be continually awakened for the dressings to be changed, though usually the wetness itself wakes him. His position in bed must be frequently altered to relieve any long-continued pressure on any bony prominence and he needs an air-cushion to lie on. Even if he has no cystitis his bed tends to smell offensively, but with the care that is bestowed on him by the sister and nurses in a good hospital or home this is reduced to a minimum. His dressings at hospital price cost about £1 5s. per week; only an approximate estimate is possible. If the patient has a catheter tied in, his soaking condition is mitigated somewhat; but it is not completely relieved. The external opening of the fistula is now closely strapped so that it may heal by third intention, but very often the strapping becomes loosened by

urine, and occasionally leakage occurs outside the catheter. The proceeding seldom hastens recovery as far as can be judged. The condition continues for a variable time. The usual time for the fistula to heal in a simple case is three weeks after the operation ; some heal more quickly and some take six weeks or more. A week after the fistula is healed the scar is quite firm and sound. It is better to wait for this before allowing the patient to walk, for if he walks about too soon the fistula sometimes becomes patent again, and this is often accompanied by hæmorrhage.

It is obvious that there is need of some kind of dressing for the patient during the period which elapses between the removal of the tube and the closing of the urinary fistula. This time is at least one week ; it is generally about three weeks and often longer still. One naturally hopes that improved technique in the operation may result in so shortening the average period of convalescence that the dressing may hardly ever be required. At present, however, the need of some such device is very great. The requirements are (1) a dressing which shall be applied on the surface of the skin, and which shall not enter the fistula at all—which shall not, therefore, tend to prevent it from closing or cause harm in any way ; (2) a dressing which shall collect effectually all the urine flowing by the fistula, and allow it to drain away freely to a receptacle without wetting the patient's skin ; (3) a dressing which shall in no way inconvenience the patient either by its bulk, or by causing irritation of the skin, or by its attachment to parts remote from the wound as might very reasonably be necessary ; (4) a dressing which shall only need occasional inspection and attention, just so much as may be necessary at the same time for proper attention to the edges of the fistula, when, for instance, the granulations become exuberant ; (5) a dressing which shall be transparent and so allow the wound to be easily seen ; and last of all, (6) a dressing which shall be easy of application, simple, unlikely to go wrong, and which shall also be cheap, aseptic, and easily cleaned and sterilised. Such a dressing has been devised. I will not weary you with the preliminary trials and experiments which have been detailed elsewhere,[1] but will show you some samples of the devices. In my opinion anything in the nature of a truss

and "apparatus," for several reasons, is not likely to prove satisfactory for the purpose while the patient is lying in bed. The final device adopted is very simple and consists of a small, clear glass vessel of special construction. It can be applied around and over the fistula, and from it the urine is led away by a side tube. The glass is attached to the patient's skin in a water-tight manner by means of a disc of sheet rubber and an aseptic solution of pure rubber in naphtha, in much the same way as a puncture of the inner tube of a bicycle tyre is repaired. The correct strength of the rubber solution was found by trial. The disc has a central, circular hole smaller than the glass, and the two are joined together by springing the edge of the hole over the glass. The total weight is 3 drachms. Every detail of the size of the various parts of the dressing has been the subject of careful inquiry. The hole in the top of the glass is to prevent siphonage by allowing the entry of air. It was found that when there was no hole the siphonage action, however slight, sucked out the edges of the fistula and prevented healing. Three sizes are provided, the largest being oval. The oval form may be applied as soon as the urine is so free from débris that the exit tube will not become stopped up. It is large enough to cover any ordinary wound and has been proved to be satisfactory. A pendulous abdomen with a gaping wound interferes with the arrangement. I think it probable, from various trials, that the best way to manage in such cases will be to use an oval piece of the sheet rubber large enough to cover the wound, and to have also a margin of an inch and a half all round to punch in it a hole of the size required for the smallest glass, and then to apply the dressing when the abdominal wall is as flat as can be arranged. The central portion of the rubber is not covered with solution in this case. The sheet rubber adapts itself so admirably to the wrinkles of the skin that this method is better than increasing the size of the rigid part of the dressing. The glass will be found to remain suspended over the centre of the wound, level with the skin, and will not enter it. The objections are that the glass is apt to become crooked unless the rubber is very carefully adjusted to it, and that the manipulation of a large piece of sheet rubber, which has been moistened with rubber solution, requires

some practice and skill. Messrs. Down Bros., Ltd., now supply this extra piece of sheet rubber in the complete set of dressings which they send out; but, as in the case of nearly all new principles, time and experience alone will settle which is the best way to deal with any particular case. If those who use the device would record their experiences it would help towards the solution of the problem in a more simple and efficient manner than hitherto.

The essential conditions for the efficient application of the dressing are that the skin shall be free from hair, grease, and ulcers, that all the parts coated by the rubber solution shall be quite dry, and that the solution shall be allowed to become sufficiently "tacky" before the application is made. It is not necessary for the sutures to have been removed, provided the free ends are cut short. When carefully applied it is usually efficient for four days. It does not impede drainage in the slightest degree and it causes no harm whatever. At the end of four days, either by reason of epithelial desquamation, the growth of the hair, or the secretions from and movements of the skin, the dressing may become loose and allow leakage of urine. It is then removed and reapplied if necessary. So far the longest period for which the dressing has remained perfectly efficient without needing attention is twelve days. The skin showed no sign of irritation and no other ill-effect was noticeable. By this means, then, a patient, who before was wet and exceedingly uncomfortable, may be kept dry and comfortable. In some cases it will, I venture to think, make the difference between life and death, chiefly because he is enabled to sleep well. The infirm patient liable to bronchitis could be got up. The quantity of urine he is passing can now be accurately measured. This may lead to interesting results in the clinical history and in the pathology of the recovery of cases of hydronephrosis. The bladder can be washed out without disturbing the dressing, which by its presence greatly facilitates the proceeding, since the lotion which has been run in by the catheter flows off by the tube, and, if the head of water is not too great, there is no overflow through the hole in the glass. The lotion can be run in either through a catheter or through a tube introduced through the hole in

the top of the glass. During the lavage, instead of the patient being cold and drenched, the bedclothes and linen soaked and the floor covered with lotion and urine, he remains absolutely dry and warm, and it is not necessary to expose him so much as before or even to place a mackintosh under him. Continuous irrigation of the bladder is also easily arranged. This may prove of great value if severe sloughing occurs, and may prevent septicæmia. Perhaps it may help towards a rational treatment in cases of phosphatic deposition.

There are many other possibilities in the principle; for instance, the walls of a small fistula may be lightly cauterised, and it may then be sealed up by an application of a piece of sheet rubber previously slightly stretched. This is far and away the best means known at present of strapping a suprapubic fistula, and will probably be successful in a large proportion of cases. In some cases a pad and bandage, or a pad with a light spring truss to press on the rubber disc, will make the sealing up more certain, and if at the same time a catheter is tied in and arranged for continuous drainage the chances are that the period of convalescence will be shortened. If it is desired to maintain a permanent fistula, and there are signs that it is likely to close, a piece of rubber tube with lateral holes may be inserted into it and suspended from the hole in the glass by a cross-pin. Mr. Pardoe has very kindly informed me that he has for some years employed for the purpose a flanged rubber disc sprung over a rubber catheter, and he sees no reason why this shield should not be affixed by means of the rubber solution. He, too, has had difficulty in keeping the patient dry.

After enterostomy an application of sheet rubber as protective to the skin prevents soreness around the fistula. The comfort of a patient with a biliary or a renal fistula would be materially increased by the use of the whole dressing in a suitable case. In cases of pneumothorax in which there is an external opening an air-tight joint could be readily made to the skin around it, thereby allowing suction to be applied by means of an aspiration pump or by drawing an attached rubber tube between finger and thumb, as one does to start a siphon, and then securing the tube with a clip. We are not, however, considering these extraneous matters here, and they are

only mentioned for purposes of publication in the hope that those who have the opportunity to try them will do so.

In conclusion, I wish to express my indebtedness to all those who have in any way helped me to investigate this subject, one which is so shortly dismissed in text-books that the student is not helped to appreciate its difficulties or to overcome them.

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[3] *B.M.J.*, January 17, 1903, p. 125.
[4] E. L. Keyes: *The Surgical Diseases of the Genito-Urinary Organs.* Appleton & Co., 1903.
[5] *Ibid.*, p. 464.
[6] *B.M.J.*, October 19, 1895, p. 968.

REMOVAL OF A TRACHEOTOMY TUBE WHICH HAD BECOME IMPACTED IN THE LEFT BRONCHUS.

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THE disastrous results which may follow the entrance of foreign bodies into the respiratory passages, and the difficulties which often attend their removal, impart to such cases a practical interest.

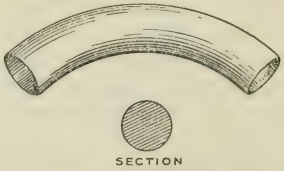
The following case came under my care when acting in the Throat and Nose Ward of the Glasgow Royal Infirmary. The patient was a labourer, 24 years of age, on whom tracheotomy had been performed eight months previously for laryngeal stenosis, and who, after being discharged wearing the tracheotomy tube, attended as an out-patient. One afternoon, having discovered that the tube had separated from its guard, he at once started for the infirmary. At the time he experienced no discomfort nor difficulty in breathing, and it was not until ten minutes later, when on his way, that he was seized with a violent paroxysm of coughing. For four hours after admission these attacks of coughing returned at intervals. The same evening the temperature was 100·2° F.

By means of the X-rays the tube was located in the left bronchus, about the level of the sixth rib, but the exhausted condition of the patient precluded any immediate prolonged efforts for its removal.

When I came on duty, he had so far recovered that he was able to get out of bed and sit up. There was nothing of importance to note in his state, beyond the fact that he had occasional attacks of coughing, that he felt weak, and looked nervous and anxious. His temperature was normal, there was no difficulty in breathing, and nothing could be detected in his chest except a few râles, which were heard on auscultating over the left side. It was decided that an effort should be made to remove the tube by means of forceps, and on measuring the parts, it was considered that Krause's laryngeal tube forceps, if

properly bent, would be found suitable. Chloroform having been administered, the tracheal wound was enlarged downwards, and through this the left bronchus was searched with the forceps closed, and acting as a probe. A metallic substance being encountered in the position indicated in the radiograph, the forceps were slightly withdrawn, and again passed down partly opened, when the tube was seized, and pulled upwards with little resistance. When about the bifurcation of the trachea, it escaped from the grasp of the forceps, and after an unsucessful search in the left, was found lying at the upper end of the right bronchus, and removed without further difficulty. It was thickly coated with inspissated mucus, but with the lumen still patent. The patient was given an injection of strychnine, and *placed* in a tent bed until the following morning. No ill effects followed. There was no rise of temperature, the cough ceased, and two days later, when the chest was examined, the râles previously noted had disappeared.

Although the foregoing history is a simple one, it is not always so in cases of this nature, and the critical character of such accidents is calculated to impress on us the necessity of exercising great care in the use of anything which may find an entrance into the respiratory passages. Such accident having taking place, however, there should be no question of the importance of performing an early tracheotomy, when once the substance has passed beyond the reach of easy extraction through the mouth, by the finger or forceps; as by so doing, we obviate any immediate danger from suffocation, and take what frequently constitutes one of the first steps in our efforts for its extraction.



A consideration of the present case leads to the conclusion, that a tracheotomy tube is one of the least harmful of foreign bodies that can escape into the lower air passages. The fact of

its being a tracheotomy tube relieves us from any anxiety in regard to obstruction at the glottis, and its shape and size, while preventing it from passing down into the smaller bronchial ramifications, facilitate extraction, and enable the air to pass through and around it into the pulmonary tissue beyond. Further, of itself it is not favourable to the setting up of a septic condition, and its position can be readily ascertained by means of the X-rays. Small round objects, as beads, beans, or cherry-stones, that fit into the lumen of the respiratory passage would present much more difficult problems, and our efforts to dislodge them might only result in their becoming more firmly wedged in the narrowing tube. When such an object, offering an unfavourable surface for grasping, becomes impacted, I would recommend that, before using instruments for extraction, its site should be located, and saturated with adrenalin introduced through the tracheotomy wound on a dressed probe. Through the action of adrenalin causing contraction of the tissues, the object might be sufficiently freed to escape on inverting the patient, and, in any case, the employment of the drug would in no way prejudice the use of other means at our disposal.

CASE WITH COMMENTS.

A CASE OF BRONCHIECTASIS SUCCESSFULLY TREATED BY INCISION AND DRAINAGE, PRESENTING SOME UNUSUAL FEATURES.

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THE treatment of bronchiectasis by incision and drainage, though giving promise of brilliant results in some of the earliest cases recorded by Williams and Godlee, has since proved so disappointing, as generally applied to this disease, that a recent writer has described the procedure as "A desperate resort to surgical measures, the hopelessness of which has now become apparent,"[1] and adds, "Although this may be regarded as a closed chapter in the history of pulmonary therapeutics, it calls for a few retrospective remarks. The few cases that have been reported in this country and elsewhere are not encouraging. A disastrous experience has shown that success can be looked for only where a single dilatation exists."[2]

The following case, inasmuch as it presented a single and accessible cavity amenable to surgical interference, in no way controverts the general truth of the above statements.

It possesses, however, certain unusual features, which, taken in conjunction with the happy result obtained, may, I hope, be considered to afford sufficient excuse for its publication.

Major S——, first seen on January 14, 1904, gave a pulmonary history extending back over a period of some eight years to an attack of bronchitis and influenza in December 1895.

In 1896, he had "fever and cough," and developed dry pleurisy at the right base, in consequence of which he was sent to Davos.

In 1897, he rejoined his regiment, and for the next three years was well enough to carry on his duties, except for occasional attacks of "fever and cough.'

In 1901, he was invalided to Château D'Oex, where he was informed by a physician whom he consulted that he was suffering from chronic pleurisy with fibrous thickening of the base of the right lung, and might expect to have dilated bronchial tubes in a few years' time. After this he was transferred from military duty in the North to Devonshire, where he remained in active work up to December 1903. He then "caught a chill" at a court martial, the consequence of which was a great increase in his cough, and the expectoration, which for some months prior to this date had averaged about 2 ounces daily, now became much more profuse and for the first time fœtid. He came to St. Leonards as soon as he could travel, and when first examined by me on January 14, 1904, presented the following condition:— He was emaciated and ill with a temperature of 102·5 and troublesome cough, which, he stated, produced in the twenty-four hours nearly a pint of very foul expectoration, the greater part of the daily "scavenging" of his lung being effected in the morning by leaning over the side of his bed. Appetite was destroyed by a constant unpleasant taste in the mouth, and much weight had been lost. Comparative dulness and complete absence of respiratory sounds of any kind existed over the lower lobe of the right lung, back and front, and the only thing audible was a well-marked pleural friction at the extreme base posteriorly, corresponding with the site of the pain which had led him to seek advice. There was marked clubbing of the fingers, and the heart was drawn horizontally so far over to the right side that no cardiac dulness remained to the left of the sternum.

After a few days devoted to the relief of the acute pleuritic pain, the patient, who had already experienced the futility of inhalations as ordinarily applied, and drugs, for the amelioration of his distressing condition, readily consented to undergo the treatment by inhalation of the vapour of coal-tar creosote, which was first introduced by Dr. Arnold Chaplin,[3] more than ten years ago, and which has since proved of signal value.[4]

No difficulty was experienced in procuring the creosote from Messrs. Burt & Co., of Silvertown, and Dr. Chaplin's regulations were carried out in detail during the short course,

which, commencing on January 21, was continued with much promise of good till February 5, but then abruptly terminated owing to an unexpected complication.

During this fortnight's fumigation, the sputum showed a marked improvement both as regards quantity and fœtor. The evening temperature fell from 103° to 101°, the appetite improved, and the patient expressed himself as feeling generally better, except for a sharp pain which kept shooting from the right shoulder blade into the hypochondrium. Careful search was made daily for the cause of this, and on February 5 a small area was found just below the angle of the right scapula, so much duller and more resistant than the surrounding parts as to suggest the presence of localised fluid beneath.

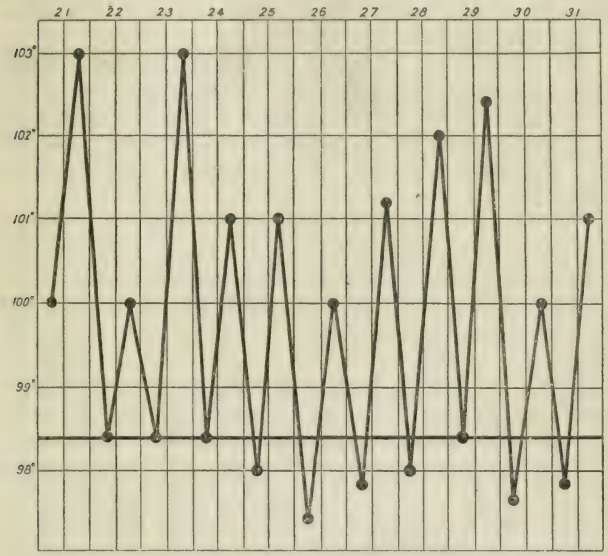
An aspirating needle produced pus apparently on entering the pleura, and, on pushing it deeper to the extent of one inch across what seemed to be a small empyema, its point engaged the surface of the lung, as evidenced by the transmitted movement. The following day, after verifying the presence of pus by puncture, I removed a piece of rib over the centre of this dull area, but found, on entering the pleural cavity, that the pus lay in the lung immediately beneath the visceral pleura through the needle puncture in which an occasional drop exuded.

Meanwhile, in the absence of any general adhesions, the lung in collapsing had carried with it what was now evidently a subpleural abscess, obliquely inwards towards the spine to a point so remote from the opening in the chest wall that to have evacuated it in its new position would inevitably have led to contamination of the pleura. A second opening was therefore made, after closure of the first, at a point nearer the middle line where a small band of adhesion had been seen to limit the recession of the lung sufficiently to render the abscess negotiable. Co-optation of the pleural surfaces being out of the question, gauze was packed around the oozing puncture without further liberation of the pus, in the hope that protective adhesions would form. This happily occurred, and, after a few days allowed for consolidation of the parts, the abscess was freely explored, and, by gradual dilatation with long forceps and the occasional division of strands of condensed lung tissue, a way was ultimately found along an

irregular sinus into a large bronchiectatic cavity which lay at a depth of six inches from the skin.

Free drainage was secured by the insertion of a large tube, and the patient began to improve at once.

In a few weeks the temperature became normal and all expectoration ceased. What sputum existed was ejected entirely by the tube and only amounted to some two ounces a day.



Temperature at commencement of treatment.

The local treatment adopted during this period of improvement consisted in the daily injection into the cavity of various antiseptics, viz. :—(1) guiacol, 2, menthol, 10, olive oil, 88 parts, the solution used by Sir Grainger Stuart for intratracheal injections ; (2) a 5 per cent. solution of thymol in olive oil ; (3) a 2 per cent. emulsion of iodoform ; (4) insufflations of xeroform ; (5) solutions of hydrogen peroxide of varying strength, which proved particularly effective in

cleansing the cavity of sticky mucopus—combined with tonics, a liberal diet, and plenty of fresh air.

The operation was performed, as stated, on February 6, 1904, and everything went well until May 6, 1904, when a startling interruption occurred in the progress of his convalescence. While a small band of dense tissue was being divided in the lung to facilitate the insertion of the tube, a tendency on the part of the sinus to contract having hitherto proved rather troublesome, the patient, who was seated on a chair, apparently fainted, for he rolled over and had to be lifted on to the bed.

On coming round he seemed dazed, complained of inability to see, and of numbness in both his hands; later on he was very sick, with much retching. The following day, May 7, he was kept quiet in bed as he still felt numbness in the left hand and "saw everything red," his pulse, too, was very rapid, 120.

On May 8, all these symptoms had disappeared, but on May 9, a sudden spasm on the left side of the body occurred at 8.30 a.m., which was repeated in a less degree at 9.45 a.m.

Between *10 a.m.* and *2 p.m.* he had eight severe epileptic fits and became profoundly comatose. As large doses of chloral and bromide by the rectum proved useless, and he seemed to be passing rapidly into the status epilepticus, a hypodermic injection of morphine muriat, gr. 1/6, hyoscine, gr. 1/200, and atropine, gr. 1/120, was given, with the result that beyond one slight fit at 2.40 p.m., he had no more seizures, and by 10 p.m. had regained consciousness. He was now put on a mixture containing bromide and iodide of potassium, the latter being added out of deference to a history of old syphilis, and proceeded to make an uninterrupted recovery, the mixture being continued for two months. His condition at the present time, two years after the operation, is satisfactory. He leads the life of an ordinary healthy man in a a moderate way, and can thoroughly enjoy his golf, fishing, and walking up to the extent of ten miles. The inflation of the lower lobe of the diseased lung has improved to a remarkable degree, and the heart, though still much out of place, has obviously receded to the left. Though the sinus persists it gives little trouble. The daily discharge amounts to

about half an ounce of clean mucus, and all the manipulations connected with the short tube, which is still worn as a precautionary measure, he can carry out himself.

There has been no recurrence whatever of the fits.

REMARKS.

The pulmonary abscess, which in this case complicated the bronchiectasis, and precipitated operation, proved, in the absence of any localising physical signs arising from the dilatation itself, of great service in determining the point of entry through the chest wall, and subsequently providing access to the primary seat of the trouble.

In attempting to offer a satisfactory explanation of the eclamptic seizures, the absence of—

(1) A previous history of fits, or inherited liability thereto,

(2) Any toxæmic condition, *e.g.*, uræmia or alcoholism,

(3) Intracranial disease due to syphilis or cerebral abscess secondary to the bronchiectasis,

(4) Impairment of function of any degree after the fits, such as would be caused by cerebral embolism, renders it hard to suggest any better reason for their occurrence than that they were "reflex" and started by irritation of the lung.

Bastian,[5] in speaking of the eclampsia of childhood, states that "irritations in the field of the fifth and pneumogastric nerves are especially potent in exciting convulsions;" and Gowers[6] cites, as an illustration of the former class, a case in which the respiratory tract was involved, the epileptic fits being dependent on the presence of a foreign body in the nose. He remarks, however, with reference to epilepsy in adults:—[7] "It is extremely rare to meet with any evidence of a reflex cause in the system of cerebro-spinal nerves, and in the few recorded cases there has been a manifest and strong predisposition in the brain."

That such a tendency may be set up by prolonged mental worry and anxiety is generally admitted, and in the present instance such factors existed to a very marked degree.

It may therefore not be altogether unreasonable to suggest that the brain of this patient had been thereby reduced to such a condition of excessive irritability that a reflex explosion

in the shape of a minor fit resulted from the irritation of his pneumogastric at the moment of section of the lung, the subsequent major manifestations being due to the well-known tendency of the morbid discharge to repeat itself when once instability of the cortex had been established.

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[5] Quain's *Dictionary of Medicine*, Vol. I., p. 400.
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Prize Essay.

THE TREATMENT OF BRONCHIECTASIS.

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INTRODUCTORY REMARKS.

Bronchiectasis, as generally understood, is a chronic disease of the bronchi, consisting essentially in simple dilatation of one or more bronchial tubes with atrophy and subsequent thickening of the walls, associated with changes in the contents of the tubes, the walls of the tubes and the surrounding pulmonary tissue.

A good deal of confusion has arisen by the use of the term bronchiectasis to include chronic cavities of the lung, which do not have their origin in a bronchus, but which are due to some other cause, and which consequently do not possess any sign of "*basement membrane*" which can be traced over the whole surface of true bronchiectasis as a continuous lining, thus proving their origin in a bronchus even in old bronchiectasis in which no trace of cartilage remains.

It is not the object of this paper to go into a description of the varieties of bronchiectasis, of which three are usually described :—

(1) Cylindrical or Simple.
(2) Saccular.
(3) Trabecular.

It will be sufficient to mention them and to point out that, if we exclude the trabecular variety, called (by Grainger Stuart) "false bronchiectasis," to which most of the literature written on this disease refers, we shall find, if we leave only the cylindrical and saccular varieties, that true bronchiectasis is not a common complaint.

In dealing with the treatment, however, no such distinction need be made from a clinical point of view. Nor need we do more than mention the term "bronchiolectasis," which is

applied to those cases in which the bronchioles are dilated. It is, however, of paramount importance to mention the conditions under which bronchiectasis occurs, since the treatment will be that of these morbid conditions and of the various symptoms which arise in the course of the disease.

The Cylindrical variety occurs both as an acute and a chronic affection.

The acute form is seen chiefly post-mortem in children who have died of:—

(1) Bronchitis,
(2) Whooping-cough.

The chronic form usually combines the cylindrical and saccular varieties in the same lung with a good deal of fibroid thickening.

The Saccular variety occurs with considerable fibroid induration of the surrounding pulmonary tissue, and, as in the case of the trabecular variety, is not nearly so often a true bronchiectasis as the cylindrical form.

The Trabecular variety is usually found in connection with bronchitis and fibroid changes in the lung.

Bronchiectasis may occur as the result of any diseases which tend to lessen the elasticity and to weaken the walls of the tubes either by—

(1) Distension from within;
(2) Diminished resistance in the walls;
(3) Traction from without;
(4) As a congenital malformation.

(1) *Distension from within* may be the effect of violent coughing in chronic bronchitis, whooping cough, &c., and pressure exerted by retained secretion, as from the presence of a foreign body in the bronchus.

(2) *Diminished Resistance in the Walls.*—Here again both acute and chronic bronchitis play an important part in the production of bronchiectasis. The inflammatory changes in the acute and the atrophic changes of the muscular and elastic tissue in the chronic form render the tubes less able to resist the strain caused by the coughing, especially where the normal tissue is replaced by fibrous material. Gummatous, tubercular and malignant growths have a similar weakening effect, especially where actual ulceration has occurred, and in

cases of acute fevers, as typhoid, the impairment of nutrition of the tissues may lead to dilatation.

(3) *Traction from without.*—Usually chronic indurative or cirrhotic changes account for this, and the fibrous tissue formed between any two bronchi contracts and causes the subsequent dilatation of the tubes thus situated with regard to the fibroid material.

With these few introductory remarks we are in a better position to discuss the treatment of the disease in question.

TREATMENT.

Prophylaxis.—Little can be done in the way of prophylaxis of the disease, for, in the present state of our knowledge, we are unable to prevent the occurrence of the changes which take place as a result of such diseases as bronchitis, whooping cough, and other morbid conditions mentioned above. Fortunately, the acute bronchiectasis, which occurs in children suffering from bronchitis, gets well, as also does that which occurs in adults, in which there is no permanent change in the walls of the bronchi. In the Saccular variety, too, it is possible for the cavities to contract and thus become obliterated, and in very rare instances the contents may become inspissated and the walls calcified.

Bronchiectasis of long standing is not strictly speaking curable, although in most cases the condition can be much improved. We can at any rate arrest the progress of the disease in many cases, materially improve the condition of the sufferer in still more, but in inveterate cases the extent of the good which we may do depends upon—

(1) The extent of the bronchial lesions.
(2) The condition of the surrounding tissues.

The most hopeless cases are those in which any form of ulceration has occurred, or where much fibroid change has taken place.

We will now discuss in detail the therapeutic measures which we have at our disposal for the relief of—

(1) The pulmonary condition;
(2) Complications;
(3) For improvement of the general health.

(1) The special treatment of the pulmonary condition may be approached with the following objects:—

(*a*) Emptying of the cavities.
(*b*) Relief of the fœtor;
(*c*) Reduction of the catarrh and protection from further irritation;
(*d*) Diminution of the size of the dilatations;
(*e*) Improvement of the respiratory functions in general.

(*a*) *Emptying of the Cavities, Postural Method.*—It has long been noticed by those who have the care of children suffering from bronchiectasis that, when the little sufferer has been placed in some particular position, a paroxysm of coughing has been brought on. Adult patients frequently observe this fact themselves, and will sometimes inform their physician of it. Use has been made of this for emptying the cavities.

In basic cases, especially, it has been found of great service to get the patient to partly invert the body by leaning over the side of a couch or bed with his hands resting on the floor. By this means coughing is set up, and the secretion, if at all profuse, comes away. It is well, when benefit is derived from this, for the patient to go through the procedure three times a day. First thing in the morning to clear the chest of the accumulation which will have collected during the night, at mid-day, and finally before retiring to bed in order to better ensure the chances of a good night's rest. This treatment alone will often produce a marked improvement in the patient's general condition, and will lessen the amount and fœtor of the expectoration.

Emetics.—Another way of emptying the cavities is by the use of emetics. An expectorant mixture such as the following may be given for two or three days:—

R. Potassii Iodidi - - - - gr. iii.
Vini Ipecacuanhæ - - - ℿx.
Spiritus Chloroformi - - - ℿxx.
Infusi Senegæ - - - ℥ss.
Aq. - - - - - ad ℥i.

Misce. Fiat Mistura. Mitte doses tales viii.
Cujus capiat unciam unam ter die,

and then the emetic may be administered :—

℞. Vini Ipecacuanhæ - - - ʒiv.
Oxymel. Scillæ - - - - ʒiv.
Misce. Fiat haustus ad vomitum excitandum.

The expectorant mixture is then repeated for another two or three days, and a second emetic dose is given. The object of this treatment is to create an abundant flow of watery mucus to wash out any stale secretion.

(b) *Relief of Fœtor.*—The therapeutic measures useful for the relief of fœtor come under two heads :—

(1) Inhalation of antiseptic and deodorising agents.
(2) Internal administration of the same.

(1) *Inhalation of Antiseptic and Deodorising Agents.*—Only those which set up a good deal of cough and expectoration are of any service. In fact, unless the vapour is sufficiently penetrating to produce these effects, the method is useless.

A small quantity of eucalyptol, thymol, or fir-wool oil may be placed in a jug, and the jug half filled with hot water. A funnel-shaped inhaler may then be made of a piece of stout paper, the large end being placed over the mouth of the jug and the small end in the patient's mouth. In this way he will inhale a certain amount of the vapour.

℞. Olei Pini Sylvestris vel Pumilionis - ♏v.
Magnesii Carbonatis Levis - - gr. iii.
Aq. - - - - - ad ʒi.
To be inhaled from a pint of boiling water.

℞. Thymol. - - - gr. vi.
Spiritus Vini Rectificati - - ʒi.
Magnesii Carbonatis Levis - - gr. ii.
Aq. - - - - ad ʒi.
One teaspoonful in a pint of water at 140° F. for each inhalation.

Or one of the many forms of dry inhaler may be used, the principle of which is the same in most patterns, namely, that of getting the patients to breathe the air drawn over a sponge, or piece of absorbent material, which is soaked in a small quantity of one of the following :—Tar, Creosote, Carbolic Acid, Terebene, or Iodine.

Inhalation may also be carried out by means of spray

producers, either by steam, as "Siegle's," or by one of the many varieties of atomisers. The advantage of the latter is their simplicity. The nozzle of the instrument is placed in the mouth or nose, and the patient, by repeated compression of the india-rubber ball attached to the apparatus, atomises the contents of the glass reservoir, and inhales the finely divided solution which may consist of any of the above-mentioned drugs. For instance, a 2 to 4 per cent. solution of carbolic acid is useful, a solution of thymol, 1 in 1000 forming the Aqua Thymol. Pulverisata of the London Hospital. In this way the disadvantages of having to use the steam apparatus are done away with, and there is no wetting of the patient or his clothes, and no need to fix up a tent around him to keep the vapour sufficiently concentrated.

Oxygen has been employed for inhalation in the hope that it would prove beneficial as a disinfectant, and also as an assistance to the respiratory act, but its use has been abandoned, for it has been found that it decreases the respiratory movements, and may consequently do more harm than good.

Any of these methods of inhalation may do good in mild cases, but their action is neither so continuous nor penetrating as that of the method first brought forward by Dr. Chaplin, namely:—

The Creosote Vapour Bath.—The splendid results of this method and its safety place it foremost in the ranks of the many remedies which have been from time to time suggested. The principle of the method is a rational one, namely, to set up a sufficient amount of coughing to empty the dilatations of all secretion, and to keep up the action of the disinfecting agent for a length of time sufficient to purify the mucous membranes.

It will be readily seen that, by the inhalation of vapours from a jug, or dry inhaler, or from steam spray producers, or atomisers, the action is not one which can be kept up for any length of time, and it is in this respect that Dr. Chaplin's method is so far superior to all others. He had noted the fact that workmen employed in an atmosphere of creosote boasted of their freedom from asthma and consumption, and asserted that the fumes "cleared the chest of phlegm," and the

knowledge of this fact led him to employ the method now to be described.

A small room must be set apart for the carrying out of the treatment. Its size should be about 6 ft. by 7 ft. by 8 ft. high, and it must be rendered as air-tight as possible by stopping all cracks with tow or some other suitable material. The patient is introduced into the room having previously stopped up his nostrils with cotton-wool and protected his eyes with close-fitting goggles, or with watch glasses fastened to his face over the eyes with sticking-plaster. These precautions are necessary as the vapour is intensely irritating to mucous surfaces. It is well too for the patient to cover his head with a close-fitting cap, and to wear a macintosh over his clothes, as the smell of the vapour clings to the hair and clothing with great pertinacity.

About three ounces of the liquid coal tar creosote are placed in a metal dish and some sand may be added to prevent it from catching fire. A spirit lamp is lighted and placed beneath the dish which is to be supported on a tripod. The vapour comes off and permeates the whole of the small room. At first it will be sufficient for the patient to remain in the room for about ten minutes and on alternate days only. Subsequently, however, the duration is increased to one hour every day and the treatment should be continued for a period of two months. The patient, as a rule, feels so much benefited by this treatment that he soon forgets the unpleasant effects of the vapour, namely, violent coughing, and the smell which is carried to a long distance.

The chief practical difficulty in private practice is the setting apart of a separate room, which is an absolute necessity and more easily managed in a hospital. The effect of this treatment is to exercise the respiratory organs, the cavities are emptied and disinfected by the coughing produced, gradual contraction of the dilated tubes takes place, and finally the general health improves to a marvellous extent.

Another method which has had excellent results in inveterate cases of fœtid bronchiectasis is that of

Intra-tracheal Injections.—A syringe with a nozzle of special construction is used, made of silver and glass such as "Bronner's." The patient is directed to thrust forward the

tongue and to hold it out by grasping it firmly. The nozzle is directed over the back of the tongue care being taken to avoid touching it or the palate. It is carried backwards until the tongue and epiglottis are passed. The point is now directed downwards and slightly forwards. The instrument is so shaped that when the handle touches the upper teeth the point is in the glottis. He is then told to take a long breath and the injection is rapidly administered. With practice the use of the laryngoscope is not necessary as an aid to this.

One drachm of the following solution :—

Menthol	- - - -	10 parts
Guaiacol	- - - -	2 parts
Olive Oil	- - - -	88 parts

is injected twice daily.

Some have found better results with a 10 per cent. solution of Izal in glycerine used in a similar way. This method is the only one which aims at disinfecting the secretions in the cavities by means of a local application, and at dealing directly with the mucous membrane.

We cannot say for certain how much of the injection reaches the diseased area of the lung, but the patient should be placed in the position most likely to favour such a result. This position may be assumed, if possible, by the patient at the time of the injection. If not he may be put into the desired posture as soon as the injection has been made. It will almost always be possible to direct the nozzle of the syringe to one or other lung, and so to ensure that the diseased lung is receiving the fluid used. More than this cannot be guaranteed, when once the fluid has left the nozzle of the syringe it will take the most direct course down the tubes.

One word of warning is necessary with regard to this method. It should not be used in phthisical cases for fear of causing a spread of the infection from the upper to the lower lobes. In all other cases good results have been obtained.

Any of the above methods may be used for the relief of bronchiectasis, but it is as well to employ at the same time the other therapeutic measure at our disposal, viz. :—

(2) *Internal Administration of Antiseptic and deodorising Agents.*—The list of such remedies is a long one, and amongst

others may be mentioned :—Terebene, tar, creosote, copaiba, thymol, eucalyptol, guiacol.

These are best taken in capsules, in appropriate doses.

Two minims of creosote with two drachms of cod-liver oil three times a day is a useful mixture ; to avoid gastric irritation a little milk should be taken before and after the dose, or Syrupus picis liquidæ, U.S.P., 1 to 4 drachms, may be given.

In Germany, Myrtol, the volatile oil obtained from the leaves of the common myrtle, is well spoken of given in capsules containing two minims. Two capsules being taken every two hours.

The drug, however, which has given the best results is garlic, the use of which Dr. Poore was the first to introduce. He took advantage of its penetrating qualities, of its volatile constituents, and also of its antiseptic, stimulating, and odoriferous properties. The active principle of garlic (the bulb of Allium Sativum Liliaceæ) is contained in the oil and is probably sulphide of Allyl.

The drug may be administered in various ways :—Chopped and mixed with beef-tea, or taken in gelatine capsules. Thirty grains of chopped garlic in capsules have been given eight times a day without ill effects. It may also be given as :—Fluid extract, dose ½ to 2 fluid drachms.

Syrupus Alii, U.S.P., 1 to 4 fluid drachms.

Oil of Garlic.—This has a very penetrating smell, and should be taken on a full stomach in capsules containing ½ minim 3 times a day.

The local effect of the drug is produced at the mucous membranes by exhalation, but the fact that the odour is given off from the skin points to its exercising a widespread remote action. The fœtid smell of the breath is lost, and now resembles that of the syringa flower. The drug should always be given with the meals.

MECHANICAL TREATMENT.

Some of the methods already described, such as postural, might be classed under this heading, but the principal mechanical method which is suggested by Gerhardt is a methodical expiratory manual compression of the chest and abdomen. He suggests that manual compression applied during expiration

leads to elevation of the diaphragm and reduction of the dilatations, increase of vital capacity, and promotes expectoration, and he mentions a case which was much benefited by this means.

CLIMATIC TREATMENT

For the reduction of the catarrh.

For the protection of the mucous surfaces from further irritation.

The effect of special climates has done much towards the arrest of the disease by strengthening the system generally, and by giving the diseased mucous membranes a chance of recovery by enabling the patient to live in a climate in which the air is warm and equable. Such climates are found in South California, the higher ground of South Africa, in the Islands of the West Indies, and in many places along the shores of the Mediterranean. It is impossible here to go into details of all these, but it will, perhaps, not be out of place to say a few words about the Island of Jamaica, since not much has been written about it as a health resort. In fact, it has only recently become known in this respect, and it has the advantage of combining an equable climate with the possession of springs and baths, of which all are of use in treating the disease now under discussion.

The temperature of Jamaica rarely goes below 60°, and seldom above 90°, thus giving great uniformity. The tropical heat of the sun is tempered by a constant breeze blowing off the sea during the day, and towards evening a gentle breeze comes off the hills to the sea, bringing with it the fresh air of the higher ground. The rainy seasons occur in May and October, so that from November to April is the best time to visit the island, and the patient can practically live out of doors during these months.

One mineral spring in particular is of service in the treatment of bronchiectasis, viz., the hot sulphur at Bath temperature, 126°, similar to those at Harrogate, Aix-les-Bains, and many others situated in localities in which the climate is not so suitable as in Jamaica. The warm salt bath at Milk River is available (temperature 92°). Much has

been done lately to improve the buildings and general arrangement at this place for the benefit of patients.

Use may be made of respiratory exercises; deep inspiration, followed by deep expirations, for the improvement of the respiratory functions in general; massage and passive resistance movements followed by rubbing, particularly in cases in which the right side of the heart is affected as a result of the pulmonary lesions.

CONSTITUTIONAL TREATMENT.

This is important, but need not detain us long, as much that has been said when discussing climate and general hygiene is obviously included under this head. When the disease has been traced to syphilis, mercury may be used.

Such drugs as iron, especially the syrupus ferri iodidi, quinine, cod-liver oil, hypophosphites of calcium, will help to combat the exhausting effect of the prolonged catarrh.

Diet should be liberal and nutritious.

TREATMENT OF COMPLICATIONS.

The complications and sequelæ of bronchiectasis are so many and varied that it is impossible in a short paper of this description to do more than merely mention them; they must, of course, be dealt with as they arise with appropriate remedies.

Pneumonia, caused by inflammation in the walls spreading through to the adjacent lung, may be set up, sometimes going on to abscess or gangrene, and this, if it does not cause the patient's death (which it usually does), may lead to extension of the cavity and pneumo-thorax.

Broncho-Pneumonia may arise by the drawing in of the fœtid secretion into the air tubes, and this, too, may be followed by abscess or gangrene.

Phthisis is frequently associated with bronchiectasis.

Hæmoptysis is, as a rule, not seen in its worst form, but has proved fatal by erosion of a large vessel.

Abscess of the Brain and Suppurative Meningitis have been known to occur, as also have sub-acute inflammations of the joints, all of these being caused by septic absorption in fœtid cases.

Finally, fatty heart, fatty liver, amyloid disease, the result

of cachexia of long standing, are the closing scenes in some cases. The effect of the pulmonary lesions on the right side of the heart will cause, late in the disease, œdema of the feet, enlarged liver, and albuminuria.

We now come to the question of

SURGICAL TREATMENT.

Little need be said on this subject, as the results up to the present time have been disappointing and even attended with danger.

Injections of weak solutions of iodine, carbolic acid, &c. through the chest walls into the pulmonary tissue, have been tried, but without benefit. Incision and drainage of the cavities, beneficial in other conditions, have proved unfavourable in cases of bronchiectasis; but, of course, in cases due to a foreign body in a bronchus, surgical interference may be absolutely necessary to save life. In some cases, where only one dilatation existed, good has resulted, but the chances are that such cases would have improved without surgical interference under the methods of treatment already described.

In cases where many dilatations exist, it is obviously impossible to treat every one surgically, and the opening and draining of only one will not benefit the others, but will probably do more harm than good by weakening the chest walls, and so taking away the patient's power of emptying the cavities by lessening the efforts of coughing.

Treatment of Cases of Bronchiectasis occurring in Children.

A few remarks on the treatment in cases of children will not be out of place here.

Direct relief of the symptoms is not called for except when the expectoration is foul and copious.

Turpentine is as good as anything, and may be given in doses from 10 to 20 minims daily to children of from 10 to 12 years of age, divided into three doses, and the air of the room may be charged with vapour.

℞. Olei Terebinth - - - - ʒii.
Melis - - - - - ℥iss.
Pulv. Tragacanth Co. - - - ʒi.
Aq. Menth. Pip. - - - ad ʒvi.
Misce. fiat mistura.

Two teaspoonfuls three times a day after meals for a child 5 years of age; or

Creosoti - - - - -	♏ss.
Spirit. Vini Rect. - - -	♏iiss.
Spirit. Chlorof. - - - -	♏iiss.
Tinct. Cardam. Co. - - -	♏v.
Ext. Glycyrrh. Liq. - - -	♏v.
Mucilag. Trag. - - -	♏x.
Aq. - - - - -	ad ʒi.

Dose for an infant of one year.

The Syrupus Picis Liquidæ is also suitable.

The patient may also be placed in the position which excites coughing several times a day. The use of intra-tracheal injections is not suitable for children, nor indeed for any nervous patient, owing to the difficulty of the procedure with them. The cough should not be checked unless sleep is interfered with.

The general health should be looked after, and much time should be spent out of doors in a dry mild climate, except in severe cases, in which a moister air is preferable.

PROGNOSIS.

This entirely depends upon the complications which arise. The disease may last for years without change in the condition of the cavity, but complete cure is impossible except in acute or slight cases. The chief dangers to life occur from chronic changes going on in the walls or around them from decomposition of the secretions leading to general septic infections, or from hæmoptysis or phthisis. It is against these dangers that our efforts must be directed by the use of a suitable combination of some of the various methods of treatment described, bearing in mind that, although bronchiectasis is a troublesome disease to deal with, much has been done of recent years to remove what has been rather a reproach to medical science, namely, the inability to check its progress when once the lung has become the seat of the bronchiectatic dilatations.

REVIEW OF DENTAL SURGERY.

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A REVIEW of the dental literature of the past year discloses no startling advance, but it does show a deepening appreciation of the important part that the mouth, of necessity, plays in preserving health and in determining disease. The report of the discussion on toothache, neuralgia, and remote affections of dental origin, in the dental section of the British Medical Associating Meeting at Leicester (*B.M.J.*), is full of interest, and a few points will be noted here. Dr. Risien Russell referred to possible causes of dental pain—anæmia, the rheumatic or gouty state, malaria, debilitating diseases such as influenza, aneurysm of the internal carotid artery, facial hemi-atrophy, diabetes, tabes in which it may be an early sign, hysteria, neurasthenia, tumours, epileptiform neuralgia, intracranial disease. Sir Victor Horsley drew attention to the fact that true epileptiform neuralgia sometimes originated in an ascending neuritis, starting from a chronic ostitis of a tooth socket. Other speakers mentioned cases of dental neuralgia so severe as to be mistaken for epileptiform neuralgia, showing the great importance of a dental examination before deciding on the major operation.

Mr. J. Howard Mummery emphasised the importance of Head's areas as worked out for individual teeth. These areas, however, are not often clearly marked, neuralgia minor being by far the commoner manifestation of pain in dental cases. Mr. Baldwin was stongly of opinion that in these cases there was always a piece of living nerve in the tooth to account for the referred pain. This, though apparently a small point, is one of considerable interest both in its bearing on diagnosis and on the pathology of "neuralgia."

Dr. Urban Pritchard referred cases of true earache, especially if accompanied by suppuration, during the teething period to adenoids, but was of opinion that during this period

such suppuration was more difficult to heal. Others, who discussed the disorders of dentition, referred them almost *en bloc* to gastro-intestinal troubles. The pain of erupting a tooth through an inflamed gum being but a precipitating factor in producing such acute symptoms as convulsions. Dr. Hutchison, discussing this point, quoted cases of babies suffering from eczema of the face, in whom the process took on a more acute character as each tooth was erupted, and suggested that there might be an analogy between this condition and the recurring bronchitis or diarrhœa often noted: but we would add that there should be at least a pre-existent latent bronchitis or intestinal catarrh; practically a rickety condition. The general result is to dethrone teeth from the position they once occupied as the cause of all the ills of infancy, and to allot to them but a very small and subsidiary share.

Mr. J. F. Colyer has investigated the dental diseases of horses and finds caries and pyorrhœa of common occurrence. The latter starts with the impaction of chaffed hay and straw in the dental interspaces, and is often a cause of serious disability. In a later paper read before the Odontological Society of Great Britain, he showed specimens of extra teeth in the horse; and of "inferior retrusion," in which the lower teeth both incisor and molar bite some half inch to one inch behind their normal position, in the same animal. Such a condition is common in man.

In 27·7 per cent. of the mares examined rudimentary canines were found.

A point of special interest in connection with caries in horses is here noted—in the "lakes" of cementum of the molar teeth, a small defect in the shape of a minute canal running the whole length of the tooth, is very commonly found, and it is round this canal that caries begins. Into this canal fermentable carbohydrate food—oats, &c.—is forced, and caries eventually results.

Following up the subject of discussion at the Leicester Meeting of the British Medical Association, Dr. Leonard Guthrie (THE PRACTITIONER, October, 1905) published a paper on "Disorders Associated with Primary Dentition." Presumably the paper is fresh in the minds of all readers of THE PRACTITIONER—if it is not, it will well repay

reperusal—and it need only be mentioned that he strongly supports the view that gastro-intestinal disorders sequent on bad feeding are at the root of most, if not all, of the troubles associated with primary dentition.

The interest awakened in oral sepsis by the discussion on the subject at Oxford continues. As is to be expected, the mouth is now regarded as a possible site of the original infection in many local and general infective processes. Under the term "infection" we include both absorption of bacterial poisons and of bacteria themselves. To give point to this reservation Mr. Kenneth Goadby (*Transactions of the Odontological Society*, March, 1906), speaking of the vaccine treatment of pyorrhœa alveolaris by the injection of killed cultures of staphylococci, after Wright's method, notes that the injection is often followed by well-marked intestinal pain and tenderness, showing that the common intestinal troubles of pyorrhœa alveolaris are at least as much due to local absorption of toxins as to the effects of swallowing the pus welling up from the infected sockets.

This paper by Mr. Goadby seems to mark an important stage in the development of a successful treatment of pyorrhœa alveolaris. By bacterial examination he has shown that certain cases of this disease depend on a staphylococcus infection, and in these cases he reports that he has been able to effect great improvement, if not actual cure, by the use of Wright's method of injection of killed cultures. He insists on the importance of closely watching the curve of the opsonic index, repeating the injection when the index is rising and avoiding the period when it is falling—the negative phase. He insists, too, on the necessity of local treatment to provide for surgical cleanliness and free drainage. The vaccine treatment by no means does away with the necessity for local treatment, it rather emphasises its importance; and it is the difficulty of this local treatment, due to the complexity of the pockets produced by the pyorrhœic processes round multi-rooted and closely set teeth, which constitutes the greatest bar to the cure of pyorrhœa alveolaris. To judge from Mr. Goadby's recorded cases, judicious use of a vaccine treatment will greatly improve the patient's general condition, but we prefer to await the result of further clinical work before accepting it as a cure

of the local condition, even in those cases which are due to a simple staphylococcus infection.

Turning to the mouth as a source of bacterial infection, it is obvious that a decision can only be arrived at clinically by the process of exclusion. Bacterial examination of both mouth and diseased part may establish a relationship, but if too much stress is laid on a negative result, an important part of the treatment—mouth hygiene—may be neglected. The following is a case in point. The patient was the subject of persistent pyrexia and general debility; no certain diagnosis could be made, and no treatment was found to improve her. Pneumococcus was cultivated from the blood. Her mouth showed extensive pyorrhœa alveolaris; but, though repeated trial was made, no pneumococcus was found in the mouth. Nevertheless, she recovered slowly but steadily when her mouth-condition was cleared up by gradual extraction of all the teeth.

As a cause of secondary local infection, Mr. E. Kenneth Campbell (*Lancet*, July 22, 1905) credits the mouth with the production of iritis.

In a paper published in the *Journal of State Medicine* (April, 1905, pp. 215 *et seq.*), on the Relation of Children's Teeth to Public Health, the present writer suggests that epidemics, not only of diphtheria, but of measles, scarlet fever, influenza, may be due in children to transference from one mouth to another, by means of slate-pencils, &c., the germs of the disease lurking in the cavities of carious teeth and in the dental interspaces of uncleaned mouths; and that the germs of rheumatic fever and pneumonia, finding lodgment under the same conditions, may, when the child's general resistance is lowered, as by a chill, prove too strong, and give rise to their specific disease manifestations.

As to tubercular infection, the writer could not find evidence enough to prove direct infection of glands from the mouth, but suggests that the chronic inflammation of the glands, sequent on oral sepsis, renders them a site of lowered resistance, and that they become infected with tubercle, *viâ* the blood stream, or tonsils.

In the same paper attention is called to the possibility of malnutrition, due to dental conditions, leaving its mark on

the eyes in the form of myopia, due to yielding of an ill-nourished globe when schooling puts an extra stress on the external muscles of accommodation.

Hitherto some attempt at sequence has been made, but the further points we shall notice as of interest to readers of THE PRACTITIONER are so scattered that no attempt at sequence can be maintained.

Douglas E. Caush (*Brit. Dent. Journ.*, Vol. XXVI., Jan. 16, 1905) publishes micro-photographs which he considers show that there is between the prisms of enamel a certain amount of uncalcified tissue which will take histological stains. This, he considers, explains the staining of enamel by leaking amalgam fillings.

Jurgens (*Berlin. klin. Woch.*, p. 629, 1904) cites a case of stomatitis, in which gonococci were found. The man had had gonorrhœal urethritis shortly before the onset of the mouth trouble.

Professor W. S. Miller of Berlin (*Brit. Dent. Journal*, Vol. XXVI., July 15, 1905) details experiments made with the view of determining the value of nitrate of silver in preventing or arresting dental caries. As a preventive it seems to have no value; but its use in solution or in powder is of considerable value in arresting decay, and may be used in extensive caries where ordinary stopping processes are out of the question. The treatment is not new, but a demonstration of its utility is of value.

C. Rose (*Deutsche Monatsch. f. Zahnheilk.*, December, 1904, quoted in *Brit. Dent. Journal*, Vol. XXVI., February 1, 1905) reports on the condition of the teeth of the people of Dalarne and the island of Gothland. Among the people of Dalarne the percentage of decayed teeth stands in inverse ratio to the hardness of the water, which is in general above the average hardness, and the teeth show an average of decay well below the usual standard. Among the Gothlanders dental caries is extremely prevalent, and their water is below average hardness. So far, it seems as if the lime salts in drinking water were a determining factor, by contributing or withholding the materials necessary for the formation of teeth. But investigation of food materials showed that the people of Dalarne eat an exceptionally hard bread, while those of Gothland eat

a black bread, which is soft and sour and contains sugar. Rose concludes that this is the determining factor of the incidence of dental caries.

Mr. F. Morley (*Trans. Odonto. Soc. Great Britain*, Vol. XXXVII., February 1905) records a case of septic pneumonia following extraction of many septic roots under chloroform in the recumbent position. No root was lost at the time of operation, and the pneumonia seemed to have been due to infected material trickling down the trachea during the operation. The use of ether in the sitting position, so that the head can be bent slightly forward and all discharges allowed to pass out through the mouth, would probably have prevented the onset of pneumonia.

Norman G. Burnett (*Trans. Odonto. Soc. Great Britain*, Vol. XXXVII., April, 1905) notes a case of primitive dentition in a boy of 14. The upper incisors were pointed teeth recalling the form of the teeth of a simple homolodont dentition. The condition might be atavistic.

W. N. Maggs (*Trans. Odonto. Soc. Great Britain*, Vol. XXXVII., June, 1905) suggests plugging the sockets of teeth after extraction with plugs of hard paraffin containing 2 per cent. phenol. The plugs are grooved to aid retention, and are removed about the third day. The plug is recommended as a preventive of infection, its use is not advised when osteitis or suppuration already exists.

A. G. Levy (*Trans. Odonto. Soc. Great Britain*, Vol. XXXVIII., January, 1906) describes a new apparatus for administering "gas" and oxygen, by means of which more regular mixture of the two gases is possible. The smaller bag, which is to contain the oxygen, is placed inside the larger "gas" bag, and equality of pressure is thus established in both bags. Levy explains that when both bags are inflated, the pressure in the inner oxygen bag is equal to the sum of its own pressure *plus* that of the contents of the outer bag. When the inner bag is only partially filled, no distension pressure is produced in it, and its final pressure is equal to O *plus* that of the outer bag, that is, the two gases are at the same pressure. Actual experiment demonstrates the truth of this explanation.

In administering the mixture, both bags are exhausted of

air; the oxygen bag is inflated to about three-quarters full, and "gas" is run into the outer bag and kept continually replenished during the administration. The oxygen supply from the small bag, which is to mix with the gas, is regulated by the usual stop-cock; but for an ordinary administration no more oxygen is taken from the cylinder beyond the first three-quarter bag-full. In prolonged operations more is needed, and two celluloid windows are provided in the outer bag to allow of observation of the state of the smaller bag.

A. F. A. Howe (*Trans. Odonto. Soc. Great Britain*, Vol. XXXVIII., January, 1906) describes and illustrates the teeth of the pygmies of Central Africa. In general they are good and remarkably free from caries. The average age of these people seems to be about 40, and one man of 35 had lost some of his teeth through absorption of the bone—possibly an old-age change. Attrition is common, and affects both incisors and grinding teeth. The dental arches were small but regular. In the discussion which followed the paper, Dr. F. C. Shrubsall pointed out the peculiar features of the mandible common to all the pygmy people, whether Bushmen or Central African pygmies. The sigmoid fossa, he said, was deep in ordinary races, but always very shallow in the pygmy races, and the edge of the angle of the jaw was very rough; the ramus was also very short, sometimes actually shorter in height than in width. The Sicilian pygmy differed from the African pygmy in having quite a large dental arch.

In Vol. III., *Transactions of the Fourth International Dental Congress*, there is a minute description of an artificial larynx and glottis devised by Leon Delair of Paris, by means of which he has successfully restored phonation and deglutition to a patient, who had been the subject of complete extirpation of the larynx. The apparatus, Delair says, can be made by any dentist who follows his directions.

Harwood-Yarred and P. N. Panton (*Lancet*, February 17, 1906, Vol. CLXX.) describe a series of 11 cases of stomatitis and tonsillitis, in which the spirochœta and fusiform bacillus described by Professor Vincent were present. At present very few cases of Vincent's angina have been described in this country, but this series suggests that it may be of common occurrence.

W. J. Rae (*Dental Cosmos*, Vol. XLVII., April, 1905) describes five cases of ankylosis of the temporo-maxillary articulation. The mandible showed marked failure of development in those cases of early onset.

Miller (*Dental Cosmos*, Vol. XVII., January, 1905), "A Study in the Pathology of the Teeth," notes that the enamel cuticle (Nasmyth's membrane) and a special thin layer or crust of enamel lying immediately under it are of particular service in resisting the action of acids. He relates experiments tending to show that there is a distinct variation in resistance of the enamel itself to the action of acids. He thinks, also, that the vitality of a tooth enables the dentine to offer a certain resistance to the progress of caries.

C. A. Hawley (*Dental Cosmos*, Vol. XLVII., May, 1905) publishes diagrams, by means of which he claims that it is possible to estimate the size and shape of the arch which any given set of teeth should occupy. If a V-shaped arch is to be reduced to normal shape, by means of actual measurements and construction of similar figures the shape to be worked for can be figured.

Mr. A. Hopewell Smith (*Trans. Odonto. Soc. Great Britain*, Vol. XXXVII., February, 1905) describes the microscopic appearances of a tooth in which there was almost total failure of formation of the coronal dentine. Under the enamel cap was a mass of soft pink tissue, which, on microscopic examination, suggested sporadic attempts at dentine formation. Such cases are extremely rare, and one at least seems to have been mistaken for tumour of the pulp.

Ethyl chloride and somnoform as dental anæsthetics have been, and rightly so, we think, adversely criticised by W. J. M'Cardie and Bellamy Gardner. The former (*Brit. Med. Journ.*, March 17, 1906, p. 616) quotes several fatalities under ethyl chloride administered for dental purposes, and adds that several deaths have occurred from somnoform—presumably, however, not all dental. He says that, owing to the rapidity with which the various phases of narcosis pass by, the administrator is liable to overshoot the mark in the matter of dosage, and to find the patient in danger before he quite realises the fact; and later urges that the after-effects of ethyl chloride are too serious to be neglected

in dental practice. According to M'Cardie, ethyl chloride should be used in dental practice in cases where "gas" has been previously taken badly, in certain hysterical cases, in alcoholics, and especially in small children. He considers the drug a depressant. Mr. Bellamy Gardner, in a paper read before the Odontological Society of Great Britain, laid stress on the cardiac depressant action of ethyl chloride and somnoform, and urged that they were far more dangerous drugs than at present acknowledged. As with chloroform, they should not be used except in the lying-down position; a view which was strongly upheld in the discussion which followed by Mr. Henry Davis, and one which seems to be becoming general among anæsthetists.

BRITISH HEALTH RESORTS.

III.—MATLOCK.

By CHARLES W. BUCKLEY, M.D. (Lond.),
Buxton.

Matlock may without fear of contradiction claim to be the most beautiful health resort in the United Kingdom, the exquisite character of its scenery having been described by Ruskin in glowing terms. It is situated on the banks of the Derwent, which rise rapidly to a height of 600 to 800 feet, and is divided into two main districts, known respectively as Matlock Bath and Matlock Bridge. Approaching from the south the former comes first and is perhaps the more picturesque, the river scenery being of the most delightful character; the town is here almost confined to the western bank, the other side forming precipitous cliffs clothed with foliage wherever a tree can find a chink in which to place its roots; the valley quickly narrows to form a gorge through which the road runs side by side with the river and then widens out again, the western bank now being the steeper while the eastern one rises more gradually though to an equal height, and upon its slopes is situated Matlock Bridge or Bank, as the higher portion is termed, the valley thence continues to widen out into the upland plain of Darley Dale. Such in brief is the topography of Matlock

Regarded from the point of view of a health resort it is necessary to deal separately with the two parts of the town, since they differ widely in the attractions they offer to the seeker after health. Matlock Bank or Bridge is perhaps the more important in this respect for it has well been called the metropolis of hydropathy, a branch of therapeutics which is comparatively little understood and still less practised in this country, although its value was clearly pointed out in the works of Hippocrates and it was also practised by Asclepiades, the friend and physician of Cicero, by Celsus, and by Musa, who restored the Emperor Augustus and the poet Horace to health by cold baths (Suetonius). Van Helmont regarded baths and affusions as superior to medicines. The method of treatment did not become popular, however, until Priessnitz came upon

the scene in 1840, and his remarkable success led to the spread of the treatment throughout the civilised world. In Germany and England his followers were chiefly laymen, and one of these, Smedley, founded a small establishment for the treatment of disease by hydropathic methods at Matlock in 1852. In Germany the medical profession took up this branch of therapeutics more quickly than in this country, and the bulk of the literature on this subject now comes from that country though even in England hydropathic treatment is now almost without exception only given under medical supervision, a great impetus having been given to its study by the publications of Ernest Brand. Hydrotherapy in acute febrile diseases hardly, however, comes within the scope of the ordinary hydropathic institution.

Smedley's establishment was soon only one of many similar institutions scattered throughout the country, chiefly in health resorts, and quite a colony of such places has arisen in Matlock, ranging from the almost palatial in grandeur to the cottage-like in simplicity, and Smedley's is now one of the largest and most complete in the kingdom, having 250 bedrooms. Hydropathics are not, however, nowadays confined to the use of water in the treatment of disease, but are really sanatoria, in which almost every branch of physical treatment is carried out, including also open-air and dietetic treatment, although it must be admitted that there has also sprung up a class of institutions known as "hydros," which are nothing more or less than middle-class hotels or large boarding-houses. In Matlock, however, as befits the metropolis of hydropathy, the former class are only to be found, and in the larger of them the régime is practically that of a medical home or hospital, the daily life of the patient being mapped out with the utmost exactitude, a factor which is not to be overlooked in estimating the value of treatment therein, since it certainly is, in some cases, at least of equal importance with the therapeutic application of water, electricity, &c.

The hydropathic institutions are scattered over the upper part of the hill-side at altitudes varying from 700 to 800 feet, and are reached by means of a cable tramway (the gift of Sir George Newnes, Bart.), for the benefit of those not able or willing to walk up the decidedly steep ascent, which is in places as much as 1 in 5. The technique of hydrotherapy and

its field of usefulness would take up too much space to permit of their being described here, and since they are not peculiar to any one place, text-books on the subject will supply the necessary information. It may suffice to mention that the chief diseases treated are chronic rheumatism and gout, dyspepsia and hepatic disorders, anæmia and chlorosis, neurasthenia, hysteria, and the various neuralgias. The chief hydriatic procedures are douches, packs, needle, shower, sitz, and other baths, and, in addition, there are available the Nauheim treatment for chronic and functional cardiac disorders, electric baths with continuous and alternating currents, high-frequency and static electricity, and thermic treatment according to the methods of Dowsing, Greville, and Tallerman.

Matlock Bath has for many years owed its popularity to the tripper and holiday seeker, to whom it perhaps offers attractions superior to those of any other inland town. Lately, however, attention has been turned to the mineral spring which gives the distinguishing name to this part of the town, and vigorous efforts have been made by the local authorities to bring the spa into line with the better-known British and foreign watering places.

The earliest record of the mineral waters dates back to the end of the 17th century, though probably the spring was in use for the treatment of disease for many years before this. In 1730, John Medley, M.D., published an essay upon Matlock Bath and its mineral waters, dealing fully, in the quaint style of that period, with their virtues from a therapeutic aspect. The analysis of the waters by Dr. Dupré is as follows:—

Sodium Chloride	4·37	grains per gallon.
Magnesium Sulphate	9·75	,, ,,
Calcium Sulphate	2·04	,, ,,
Calcium Carbonate	14·88	,, ,,
Silica	0·71	,, ,,
Oxidised organic matter, Alumina, Potassium, Lithium, Strontium	1·03	,, ,,
Total solids	32·75	,, ,,

Carbonic-acid gas is present in considerable volume in the free state. The temperature is 68° Fahr. The water is used internally for gastro-intestinal disorders, acute and chronic gouty conditions, rheumatism, and similar disorders, and has a diuretic and gently-laxative effect. Externally, it is applied in a variety of ways for the relief of rheumatic and gouty affections of the joints and muscles, certain skin diseases, such as eczema, urticaria, and psoriasis, &c.

The old public baths comprise a large swimming-bath, as well as immersion baths in which the water is applied at higher temperatures, shower baths and douche baths. There is also a large swimming-bath at the New Bath Hotel, and a complete range of baths at the Royal Hotel fitted up in the latest and most perfect style. Here, in addition to immersion baths, there are Vichy, Aix, and other douches, Turkish and Russian baths, local and general electric baths, while the water is used in the preparation of Nauheim, alkaline, sulphur, and pine baths. A special feature is made of mud packs and baths, which are prepared from a volcanic mud obtained from the hot lakes of Battaglia, in combination with the Matlock water. The mud differs slightly from that used at Buxton, though the method of application and the therapeutic range is the same.

The climate of both parts of the town is much the same. Matlock Bank faces west, and is protected by the hills from the east and north-east, while Matlock Bath faces east and south-east, but is somewhat more sheltered owing to the narrowness of the valley ; it is well protected from the north and north-west, and to a considerable extent from the east. The climate in the valley is mild and somewhat relaxing ; it becomes more bracing as the hill is ascended, the climate at the top being of quite a different character, and thus the place has advantages for both summer and winter residence, though in July and August it tends to be oppressive. This variety of climate according to position renders meteorological statistics misleading and of no value.

The subsoil is of mountain limestone, and surface drainage is excellent, while the water supply is obtained from the adjoining millstone grit formation, and is soft and pure.

FAMOUS HOSPITALS AND MEDICAL SCHOOLS.

SOME GREAT MEN OF GUY'S.

II.

[With Plates XXII.–XXIII.]

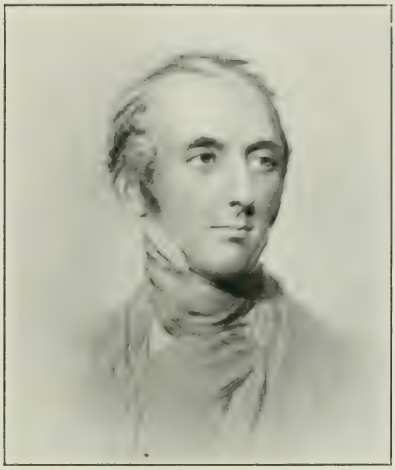
Aston Key.

One of the men who helped to build up the fame of Guy's in the first half of the nineteenth century was Charles Aston Key. He was the son of a doctor who practised in the city, and was born in Southwark in 1793. He was apprenticed first to his father and afterwards to Astley Cooper, whose niece he married in 1818. With the powerful backing thus secured his path was made easy. A post of assistant surgeon at Guy's Hospital was specially created for him and in 1824 he became full surgeon. In 1847 he was appointed surgeon to Prince Albert, and in 1849 he died of cholera. Key was a great operator, and like Liston and Ferguson had very large powerful hands. He first gained celebrity by successful ligature of the subclavian artery in a case of axillary aneurysm. The operation was performed in 1823, and a report of the case was published in the *Transactions of the Medical and Chirurgical Society*, Vol. XIII. It is said to have been the first successful case performed in London. In connexion with the operation, Mr. Bryant recalls what Wilks and Bettany call "a charming bit of romance." When he was visiting Mrs. Key some years ago, she related how well she remembered this first famous operation of her future husband; of his anxiety, day by day, whilst he was paying his visits of courtship, and how he told her that he was waiting for the ligature to come away. One day he went in smiling, and exclaimed, "The case is all right, and here is the ligature." The lady took it from him and kept it as a souvenir. Then, turning to a box, Mrs. Key put in her hand and pulled out a string, saying to Mr. Bryant, "And this is the ligature."

Another operation of Key's was the "talk of the town" for some time. This was the removal from a Chinaman of an elephantiasis of the scrotum. The operation lasted one hour and three-quarters; the patient fainted repeatedly during the operation, and artificial respiration had to be kept up. Transfusion was performed, but the man died, apparently of loss of blood, but, doubtless, partly from exhaustion, for the operation was done in 1831, long before anæsthesia was in being. The tumour, after removal, weighed 56½ lbs., a quarter of the weight of the man's body. Aston Key was a man of masterful temper, and his manners had not the repose that marks the caste of Vere de Vere. He is described as marching through the wards at the head of his pupils as if he felt himself every inch a king. Key had not studied surgical diseases in a large hospital in vain. Nothing worthy to be acquired could have escaped his quick and penetrating mind; and with this quickly perceptive faculty there was a wonderful power of diagnosis and an extraordinary *tactus eruditus*. In operating, his power of handling the scalpel was only surpassed by the wisdom which directed it, and by the resolution which never for a moment could make it waver, but rather made it a stronger instrument in his hand in proportion to the difficulties which it had to encounter.

THOMAS BELL.

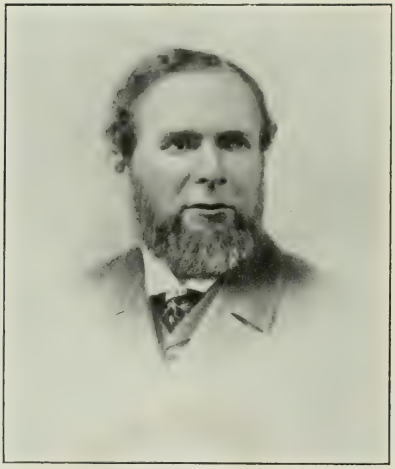
Thomas Bell deserves a place in any record of the makers of the Medical School of Guy's Hospital, for although Joseph Fox had given lectures on dentistry there, Bell was in the words of Erichsen "the first legally qualified and thoroughly educated surgeon who, devoting himself especially to dentistry, became associated in the capacity of teacher of his art and dental surgeon with a large metropolitan hospital and school of medicine." Bell, who was born at Poole in 1792, was admitted a Member of the College of Surgeons in 1815. To him belongs the credit of applying the general principles of surgery to the art of dentistry. He was far, however, from being a mere dentist. From an early period in his career he lectured on comparative anatomy at Guy's, and in 1836 he was appointed Professor of Zoology at King's College. In 1828 he was elected a Fellow of the Royal Society of which he was Secretary from 1848 to 1853. He was also President



Charles Aston Key.

John Hilton.

Sir W. W. Gull.



Walter Moxon.

of the Linnean Society from 1853 to 1861, and of the Ray Society from its foundation in 1844 to 1859. He was the author of a history of British quadrupeds and reptiles, and of a work on British stalk-eyed crustacea. He also edited Gilbert White's *Natural History of Selborne*, to which place he retired, spending his last years in the house in which White was born in 1720 and lived till his death in 1793. Bell died at a very advanced age in 1880.

JOHN HILTON.

John Hilton, whom many practitioners, not yet declined very far into the vale of years, remember as one of the most dreaded examiners at the College of Surgeons in the seventies, was born at Castle Hedingham, in Essex, in 1804, and entered Guy's in 1824. He became a Member of the College of Surgeons in 1827, and was soon afterwards appointed Demonstrator of Anatomy. From dissections made by him were prepared the beautiful wax models which are so conspicuous a feature of the Guy's Museum. In 1844 he was appointed assistant surgeon, becoming full surgeon in 1849, on the death of Aston Key. He was President of the College of Surgeons in 1867. He lectured on surgery for many years, and was surgeon to Queen Victoria, though, we believe, she never had occasion to consult him. Hilton's fame rests on his book "Rest and Pain," the substance of which was delivered in the form of lectures at the College of Surgeons from 1860 to 1862. Hilton was a keen observer, and, as a teacher, he had the faculty of extracting valuable lessons from cases apparently trivial. He applied his great knowledge of anatomy with illuminating effect to the treatment of ulcers and hæmorrhoids. According to Wilks, he gave the first clear account of the cerebro-spinal fluid and the channel in which it existed. This, again, suggested the closure of the fourth ventricle as a cause of chronic hydrocephalus. He was held in great respect by his pupils, but he had a way of saying disagreeable things that made him disliked. Yet he is said to have been really a kind-hearted man.

WILLIAM WITHEY GULL.

Guy's owed something to Gull, but Gull owed much more to Guy's. A man of remarkable personality, he was one of those strong men who seem to be especially favoured by

luck, because he had the wit always to take the tide at the turn that leads on to fortune. He was the son of a barge owner of Colchester, where he was born on the last day of 1816. He lost his father in childhood, but, like so many men who have achieved greatness, he had a mother of superior brain as well as a loving heart. To her he used to say in after life he owed his real education. From her, doubtless, he learned the nursery rhyme which he was wont to repeat till the end of his life; and which gives the keynote to his character:—

> If I were a tailor I'd make it my pride
> The best of all tailors to be;
> If I were a tinker, no tinker beside
> Should mend an old kettle like me.

Gull was helped in his early studies by a clergyman, who was the nephew of Benjamin Harrison, the treasurer of Guy's. The autocrat of the hospital became interested in the lad, and in 1837 invited him to Guy's. There, by the good offices of his powerful patron, Gull had all the advantages of an apprentice, while his maintenance was provided by a grant of two rooms in the hospital and an allowance of £50 a year. "I can help you if you will help yourself," said the treasurer to his *protégé*, and Gull showed how well fitted he was to help himself by gaining all the prizes open to him in one year. Having taken the M.B. degree at the University of London with honours in several subjects in 1841, Gull was, in the following year, appointed teacher of Materia Medica at Guy's, and his unfailing friend, the treasurer, gave him a small house in King Street with a salary of £100 a year. Appointments each carrying with it larger opportunities of studying disease were showered upon him. In 1843 he was appointed Lecturer on Natural Philosophy. He was also Medical Tutor, and in conjunction with Mr. Stocker, the Apothecary, had the care of the patients in the wards in the absence of the staff. In the same year he was appointed medical superintendent of the wards for lunatics. For several years, therefore, Gull lived in the midst of disease in all its manifestations, and he used the opportunities of observation thus offered to him to the best purpose. In 1846 he took his doctor's degree. The treasurer gave him the use of a house in St. Thomas's Street, and there he began to practise.

To that house he brought his bride when he married in 1848. A curious illustration of the luck that was his throughout life is, that the father of a girl to whom he had previously been betrothed and whom death had taken from him, left him a considerable legacy. In 1846 Gull was appointed Lecturer on Physiology and Comparative Anatomy at Guy's. In 1851 he was appointed assistant physician, and in 1858 full physician to the hospital. In 1856 he gave up the teaching of physiology to become associate lecturer with Dr. Rees on the practice of medicine.

The event in Gull's professional life that brought him most prominently before the public was his attendance on our present gracious Sovereign, then Prince of Wales, in the attack of typhoid fever which nearly blighted the hope of the nation in 1871. A writer in the *Times* thus describes Gull's behaviour at the royal bedside :—

"In Dr. Gull were combined energy that never tired, watchfulness that never flagged; nursing so tender, ministry so minute, that in his functions he seemed to combine the duties of physician, dresser, dispenser, valet, nurse, now arguing with the sick man in his delirium so softly and pleasantly that the parched lips opened to take the scanty nourishment on which depended the reserves of strength for the deadly fight, when all else failed, now lifting the wasted body from bed to bed, now washing the worn frame with vinegar, with ever ready eye and ear and finger to mark any change and phase, to watch face and heart and pulse, and passing at times 12 or 14 hours at that bedside. And, when these hours were over, or while they were going on—what a task for the physician!—to soothe with kindest and yet not too hopeful words her, whose trial was indeed great to bear, to give council against despair, and yet not to justify confidence."

Gull's contributions to medical literature were neither numerous nor of first-rate importance. He was before all, in his own words, a clinical physician, and in that capacity his power lay more in his personality than in any marked superiority of knowledge. He knew disease well, but he knew mankind better. No physician of his day had cultivated with greater success the art of impressing the patient. His utterances were oracular, and he seemed always to be saying "When I ope

my mouth, let no dog bark." Some dogs whose tails were trodden on by his heedless foot did bark, however, and he was more than once brought before the bar of professional opinion. Gull's attitude on those occasions was that of a superior being outraged by mere mortals. It is related that Sir Robert Walpole once met the Duke of Argyll coming from the royal presence with ruffled plumes. On Walpole asking what the matter was, the Duke replied that the King had used insulting language to him. The Minister sought to comfort him by saying that the King was often abusive to him, only to draw on himself the haughty reply, "You forget, Sir Robert, that between me and you there is an infinite distance." Had Gull spoken his mind, this, probably, would have expressed his feeling with regard to himself and his colleagues.

Although Gull was, unquestionably, a most sagacious physician, there was in him, as there was in Charcot and in some other eminent men, a certain tendency to pose. This was the more to be regretted, since he was great enough to dispense with the arts by which the vulgar are impressed. There could be no stronger contrast in this respect than there was between him and his great rival, Jenner. The latter was a plain, blunt man, often indeed, like Brutus, rude in his speech; his frankness lost him many a patient, for *populus vult decipi*. Gull, on the other hand, was diplomatic to the point of finesse. In the Memoir written by his son-in-law, and published by the Sydenham Society, the following story is quoted from an old student:—

"He was bold in diagnosis, and often astonished men by the minute accuracy of his prophecies. Of course, like all men, he made mistakes; but he was able to take care of himself, and I shall not forget one instance of this by which I suffered. While ward clerk for him, a child was brought into the hospital, and Dr. Gull, after a short examination, said: 'Measles; keep the little one warm.' The next day it was certain that the child had small-pox, and it was sent out of the hospital. I told everyone that I had got Gull beyond escape, and many students came to see how it would end. When he got to the empty bed, Dr. Gull said: 'Where is our little patient?' I, with wicked pleasure, said: 'In the

small-pox hospital.' He said nothing, but passed on; then, at the next bed, stopped, and quietly began thus: 'You know, gentlemen, that I have, over and over again, pointed out to you that the diagnosis between measles, scarlet fever, and small-pox could be made from a correct history of the development of the symptoms; in the case of this child I trusted to S——; I thought I *could* trust him; but I was mistaken. I am sorry!'"

A less simple-minded admirer would surely have suppressed this not altogether edifying example of the great man's dexterity in extricating himself from a difficulty by throwing the blame on someone else. The stories related of him—how he told a hypochondriac that he was "a healthy man out of health"; how he said to a lady who fancied she had cardiac disease, that she had "a tired heart"; how he pacified an inconveniently inquisitive wife with the information that her husband was suffering from "a cachexia"—are all more suggestive of the clever diplomat than of the high-minded physician. Gull had his reward, for he left behind him what was probably the largest fortune ever made by the practice of medicine.

He died in the early days of 1890. With all his shortcomings, he was what Chaucer calls "a verray parfait practisour," a teacher of wonderful influence, a most suggestive writer, and an orator of rare power. His greatest achievement is expressed in his own statement: "One thing I am thankful Jenner and I have together succeeded in doing. We have disabused the public of the belief that doctoring consists in drenching them with nauseous drugs."

WALTER MOXON.

One of the most remarkable of the men who have adorned the staff of Guy's Hospital was Walter Moxon, whose premature death was a grievous loss to medicine. He was born at Cork, of English parents, in 1836. Through his father he was distantly connected with Edward Jenner, the discoverer of vaccination. On leaving school he for some time occupied a clerk's stool in a city office. The life was not to his taste, and he entered at Guy's as a student in 1854. He distinguished himself greatly as a student, ending a brilliant career at the

University of London by graduating M.D. in 1864. He was for a time demonstrator of anatomy. In 1866 he was appointed assistant physician, and soon afterwards succeeded Dr. (now Sir Samuel) Wilks as lecturer on pathology, and curator of the museum. He was a most brilliant teacher, making even the dry bones of materia medica live, and attracting crowds of students. In 1873 he became full physician, and put in practice his own ideal of healer of the sick. "A chief pride of our noble calling," he had said in 1868, "is that in it there is direct use for every grace of mind and of body. We have to be, as it were, resting harbours, where the broken minds of the sick may refit with every mental strength; and we must be ready to create faith—that greatest of tonics—for the unbelieving, and hope—that best of stimulants—for the despairing; we must find fresh interest for the weary of life, and not merely know a few things which others are ignorant of." So well did Moxon do this in his ministrations, that Hilton Fagge, who was his patient, described him as "the perfect physician." On the retirement of Dr. Pavy from the lectureship on medicine in 1882, Moxon succeeded him, retaining the post till his death.

As a writer, it is well said by his friend Mr. Clement Lucas, that whatever he touched he cast a glow of original light upon. Moxon was a man of extraordinary subtlety of mind, and perhaps more a philosopher than a pathologist. He was a man of the finest personal character, and had a stimulating influence on all who came in contact with him. Sir Samuel Wilks says that it is possible he might have excelled still more at the bar than in medicine, or that if he had taken to literature, he might have become another Carlyle. He had a delightful humour, which came out in the most unexpected ways and places.

Of delicate constitution, he gave himself to his work with such devotion that he broke down under the strain. He died suddenly in 1886.

Reviews of Books.

Malaria, Influenza and Dengue. By Dr. JULIUS MANNABERG, Professor of Internal Medicine University of Vienna; Dr. O. LEICHTENSTERN, formerly of University of Cologne. Edited with additions by MAJOR RONALD ROSS, F.R.C.S., F.R.S., C.B., Professor of Tropical Medicine, University of Liverpool; J. W. W. STEPHENS, M.D., D.P.H., WALTER MYERS, Lecturer in Tropical Medicine, University of Liverpool; and ALBERT S. GRUENBAUM, M.D., F.R.C.P., Professor of Experimental Medicine, University of Liverpool. Authorised translation from the German under the editorial supervision of ALFRED STENGEL, M.D., Professor of Clinical Medicine, University of Pennsylvania. Pp. 769. 7 plates and 39 illustrations. London: W. B. Saunders & Co.

LIKE the good Dominie, we can only exclaim "Prodigious!" for so indeed is this sumptuous volume, with the wealth of information contained in it. The article on "Malaria" will have a perennial interest, seeing that in it is presented the stage, whereon the ætiology of the disease passes from the vague mists and illusive shadows of hypothesis into the clear noontide of exact science. On this point, and on the vitally important bearing which this has on the whole subject, the original article by Mannaberg is now of historical interest only. This English edition has been enriched by Stephens' valuable additions on the mosquito-malarial question, in all its manifold bearings. We do not hesitate to say that, from the practical point of view, these contributions are the main feature of the book, for we are in complete agreement with Dr. Stephens, when he insists on the necessity for a physician to study not only malaria, but also mosquitoes and their habits. On these points, and on the ever-important question of prophylaxis, the student will find full and accurate information at first hand, and not from a compilation.

We cannot refrain, however, from expressing a certain amount of disappointment at the section on treatment, which does not seem to have received the amount of attention at all commensurate with the high level kept throughout the rest of the article.

The articles on influenza and dengue are encyclopædic and valuable. Professor Grünbaum's task as English Editor was beset, as he explains, with textual difficulties only, and not with fundamental changes in opinion due to newly ascertained facts.

Organotherapy, or Treatment by means of Preparations of Various Organs. By H. BATTY SHAW, M.D. (Lond.), F.R.C.P., Lecturer in Therapeutics, University College, London; Assistant Physician to University College Hospital, and to the Hospital for Consumption and Diseases of the Chest, Brompton. Pp. 256. London: Cassell & Co., Limited. 6s.

THIS work forms the third volume of a new series of medical text-books on some modern methods of treatment. It deals with the histology and physiology of some of the glands of the body, and gives a detailed account

of the various internal secretions produced by these glands. Experimental evidence is referred to, and the practical use of the fresh glands and gland extracts fully discussed. Dr. Batty Shaw is to be congratulated upon the excellence of the work, for it may be fairly considered the best which deals with the subject. It is illustrated, and contains a very large number of references. These afford a valuable guide to the bibliography of this important and rational subject, which is an unusually extensive one.

Oliver Wendell Holmes and the Contagiousness of Puerperal Fever. By C. J. Cullingworth, M.D., LL.D., D.C.L., F.R.C.P., Consulting Obstetric Physician to St. Thomas's Hospital. London: H. J. Glaisher. 2s. 6d. net.

This charming monograph, written with charm and grace of literary style, worthy of Oliver Wendell Holmes himself, is a fitting tribute to his memory. Dr. Cullingworth reminds his professional brethren of the debt we owe to Oliver Wendell Holmes for his powerful, but largely forgotten, essay on "The Contagiousness of Puerperal Fever," which originally appeared in the *New England Quarterly Journal of Medicine and Surgery*, in April, 1843. He then gives an epitome of the evidence contained in that essay, using the author's own words so far as possible. An appendix contains the conclusions (including rules for preventing the spread of puerperal infection) published at the end of Holmes's essay, and a second appendix contains a biographical sketch of Dr. Alexander Gordon of Aberdeen, who had insisted on the contagiousness of puerperal fever long before either Holmes or Semmelweiss. An excellent bibliography completes the volume, which also contains a portrait of Holmes from a daguerrotype, taken between 1845 and 1850. Dr. Cullingworth has surpassed himself as a writer of charming and graceful English in this ideal monograph.

A Text-book on the Practice of Gynæcology for Practitioners and Students. By William Easterly Ashton, M.D., LL.D. Fellow of the American Gynæcological Society; Professor of Gynæcology in the Medico-Chirurgical College, and Gynæcologist to the Medico-Chirurgical Hospital, Philadelphia. Formerly Lecturer on Gynæcology in the Jefferson Medical College, Philadelphia, &c. Pp. 1079, with 1046 new line drawings, illustrating the text, by John V. Attender. London: W. B. Saunders & Co.

The author's aim, in writing this most compendious treatise, has been to take nothing for granted in his descriptive work, to state what should be done in every case, and to give directions and illustrations, sufficiently explicit to be intelligently and easily followed. Such a task necessarily demands a wealth of experience, ample scientific knowledge, sound judgment, and also a high degree of literary skill. Dr. Ashton happily possesses all these to a remarkable degree, and has, in consequence, produced a work which, it is not too much to say, is the most noteworthy among the many works on this subject recently published. The value of these text-books is very high indeed, but we think Dr. Ashton's is of higher value still. The plan adopted necessarily involved a good deal of recapitulation, and made the volume a bulky one, but the advantage to the busy man is that whatever

subject he wishes to look up, great or small, one reference to the very complete index is sufficient, for on turning to the place, he finds at once all the best there is to know before him, without the worry of cross references: "*ut supra, vide* page xyz, and so forth."

The publishers are to be heartily congratulated on the production of a volume of such sterling merit in every possible detail.

A Text-book of Obstetrics. By ADAM H. WRIGHT, Professor of Obstetrics in the University of Toronto; Obstetrician and Gynæcologist to the General Hospital, Toronto. With 224 illustrations in the text. Pp. 591. London & New York: D. Appleton & Co. 18s. net.

Too much space has been utilised in this book for the quoting of cases, which, although very excellent in a book treating of one particular subject, is out of place in a standard text-book. The description of many of the most important subjects, from the obstetrical point of view, has been passed over too lightly. The chapters on Anatomy, Physiology, and Development are all too brief, while a great deal of space has been devoted to what are called the intercurrent diseases of Pregnancy, such as Typhoid, Rheumatism, Tuberculosis, Cardiac, &c. The chapter on Contracted Pelvis is too short, and the classification of the various forms of Contracted Pelvis is not good. At the same time it must be admitted that a great deal of the book is interesting reading—notwithstanding the fact that many minor errors, against which readers must be on their guard, have been allowed to pass unnoticed. It is not probable that it will ever become a popular text-book in this country.

A Practical Guide to the Administration of the "Nauheim" Treatment of Chronic Diseases of the Heart in England. By LESLIE THORNE-THORNE, M.D., B.S., Assistant Medical Examiner, London County Council. London: Ballière, Tindall, & Cox. 3s. 6d.

THAT the benefits to be derived from the "Nauheim" treatment of chronic diseases of the heart may be obtained without leaving home—and we are assured by Dr. Thorne-Thorne that they can—will be welcome news to many patients, who are either unable or unwilling to travel abroad in order to obtain them. The treatment consists essentially in the administration of a graduated course of baths, prepared artificially, so as to resemble in all active ingredients the natural baths of Nauheim, and to produce the same therapeutic effects. The exercises, invented and perfected by the Brothers Schott, also form an important factor in the treatment. The physiological action of both these agents is to increase the volume, decrease the rapidity, and lower the tension of the pulse, and so to decrease the strain on the cardiac muscle, leading to contraction of the dilated cardiac chambers. Many sphygmographic tracings and diagrams of cardiac dulness, taken before and after treatment, demonstrate these facts. Dr. Thorne-Thorne gives explicit details of the method of giving the baths and exercises, the latter being illustrated by 28 photographs taken for the purposes. He also discusses the cases suitable for treatment. Any practitioner, unacquainted with this method of treatment, who wishes to apply it in practice, cannot do better than procure this small monograph of Dr. Thorne-Thorne.

A Contribution to the Pathology of the Endometrium. By Jessie M. Macgregor, L.R.C.P., and S., M.D., Lecturer on Gynæcology in the Edinburgh School of Medicine of the Royal Colleges, &c. Edinburgh and London: Wm. Green & Sons.

Dr. Jessie Macgregor has conferred a great boon on gynæcological pathologists by publishing her studies on the pathology of the endometrium, based on the examination of the specimens from 250 curettings of the uterus sent to the laboratory of the Royal College of Physicians in Edinburgh.

The normal structure of the endometrium, together with the changes incident upon menstruation, is first described. The pathological changes in the endometrium are next considered, the changes produced in the individual elements of the endometrium, the epithelium, the glands, the stroma, and the vessels respectively being described in detail. With regard to classification, that unsatisfactory term "endometritis" is discarded, and the pathological conditions resolve themselves into three groups, namely:—(1) Malignant disease; (2) Non-malignant disease; (3) Ill-defined transition types. An attempt to correlate the changes in the endometrium with the clinical symptoms produced by disease, viz., hæmorrhage, leucorrhœa, and pain, leads to a conflicting and unsatisfactory conclusion.

The outstanding feature of the work, however, is the fine collection of plates, consisting of 106 beautifully executed micro-photographs, which comprise a comprehensive series of accurate illustrations of the normal and pathological histology of the endometrium. These will prove of very great value to those who have not free access to microscopic specimens.

Obstetrics. A Manual for Students and Practitioners. By W. P. Manton, M.D. London: Hodder & Stoughton.

This manual of obstetrics forms one of "The Medical Epitome Series" issued by Messrs. Hodder & Stoughton under the general editorship of Dr. Victor C. Pedersen, of New York. The aim of the series is to give the maximum amount of information, both in letterpress and engravings, for the minimum price. To this end, a combination of brevity, clearness, and comprehensiveness is essential. Dr. Manton has been most successful in his efforts to fulfil these conditions, and has produced a manual of obstetrics, at once brief, clear, and sufficiently comprehensive to enable the student to master the essentials of the subject. To the more ambitious student, it will prove useful as an introduction to the larger treatises on obstetrics.

The English student, familiar with the left lateral position, may find himself somewhat embarrassed by the adoption, both in the letterpress and in the illustrations, of the dorsal position in obstetric manipulations, *e.g.*, the application of forceps. We are pleased to see the importance of abdominal examination in the conduct of labour properly insisted upon. In the treatment of placenta prævia, the vaginal tampon is mentioned as an alternative method of treatment. "The question of Cæsarian section in placenta prævia," says Dr. Manton, "is still *sub judice*, but as a scientific procedure with a greatly lessening maternal mortality, and, if undertaken sufficiently early, with a practically clean record in life-saving

for the child, it must soon become recognised as a rational and legitimate interference." We hope, however, that it will be a long time before this opinion prevails among English obstetricians. The difficulty of dealing with labour, in persistent occipito-posterior presentations, is mentioned; but we are not told how to overcome this difficulty. Dr. Manton merely asserts that "instrumental delivery is very frequently necessary in these cases." We miss the concise directions—"flex, rotate, or pull"—by Herman.

Notwithstanding these minor deficiencies, we consider the book one of great value to the junior student, to whom we thoroughly recommend its perusal.

Dietetics for Nurses. By JULIUS FRIEDENWALD, M.D., Clinical Professor of Diseases of the Stomach in the College of Physicians and Surgeons, Baltimore; and JOHN RUHRÄH, M.D., Clinical Professor of Diseases of Children in the College of Physicians and Surgeons, Baltimore, London: W. B. Saunders & Co.

THIS book is a much needed addition to the nurse's library, and contains very valuable information, so arranged and indexed, that it will serve as a handy book of reference in all questions of dietetics. The author rightly says that the training of nurses in regard to feeding is often faulty, and to remedy the failing he has given us the "essentials of dietetics" in a compact form. In Chapter 9 there are "general rules for feeding the sick," which nurses will do well to study carefully. Much stress is laid on tactfulness—"the tactful nurse is invaluable, the stupid one a source of danger." In the chapter on "absorption and digestion" are suggestions as to variety of food, quantity of food required, order and frequency of meats, &c. Tables are given showing the various food values, as the author considers that "the selection of a proper diet depends upon a knowledge of the three alimentary substances: proteins, carbohydrates, and fats, which are necessary to maintain the nutritive equilibrium, and, consequently, the body-weight." The disintegration of the above and the necessary replacement are dwelt upon at some length. The chapter on the feeding of infants and children, although it contains much useful information, reduces dieting too much to the rule of thumb, omitting an all-important factor, the human element. The formulas might prove puzzling, and seem somewhat unnecessary to some nurses. Chapter 8, on Rectal feeding, and recipes for nutrients, is excellent. The book deals systematically with diet suitable in typical forms of disease, infections, diseases of respiratory organs, circulatory system, nervous system, &c., &c., in each case giving the accepted diets, and entering fully into the reasons why they should be chosen. The value of the work is enhanced by the addition of a large number of very useful recipes and rules for cooking.

NOTES FROM FOREIGN JOURNALS.

THE VALUE OF ERGOT IN OBSTETRICS.

In the *Therapeutic Gazette* for January there is a symposium on this subject contributed to by some of the leading obstetricians in America.

Dr. Davis, Professor of Obstetrics at the Jefferson Medical College of Philadelphia, uses ergot in the great majority of cases of labour. It is contra-indicated after excessive hæmorrhage with empty vessels and feeble heart; for such condition, saline transfusion (intravenous) and strychnia are employed, but once contraction of the uterus is obtained, ergot is given during convalescence to secure a permanent result. He usually gives ergot after the birth of the child, when the placenta is almost ready to be expelled. If the mother is vigorous and the uterus is acting well, ergot is not given until the placenta is delivered. A small dose of strychnia is given with it. In forceps cases he gives a hypodermic injection of 30 minims of "aseptic ergot" as soon as the child is born. He prefers an injection after an anæsthetic, as it can be given before the patient has fully come round, there is no risk of rejection by the stomach, and the action of the drug is obtained more promptly and more efficiently. He believes in a combination of ergot and strychnine, the first to act upon the uterine muscle, and the second on the nerve ganglia and the nervous system in general.

Dr. Barton C. Hirst, Professor of Obstetrics in the University of Pennsylvania, uses ergot as a routine practice, giving it as soon as the child is born. After anæsthetics he gives a hypodermic injection deeply into the thigh, and also if there is a history of previous attacks of post-partum hæmorrhage, if labour has been unusually long and the patient shows signs of exhaustion, and also in the case of hydramnios, of twins, and of placenta prævia.

Dr. Chalmers Cameron, Professor of Obstetrics, McGill University, uses ergot in all cases of labour, but only after the uterus is empty, *i.e.*, after expulsion of the placenta. He considers that to give ergot as soon as the head is born is very questionable practice, as the third stage may be hindered or complicated by such a procedure.

Dr. Stricker Coles, Lecturer on Obstetrics at Jefferson Medical College, gives ergot after every case, but never before the uterus is empty. In normal cases, he gives one drachm of the liquid extract by the mouth, after operative cases, one or two tubes of "ergot aseptic" hypodermically. If given as soon as the head is born, ergot often causes retention of the placenta by tonic contraction of the uterus. He places great value on its action in promoting involution and gives 20 to 30 minim doses, three or four times a day, for ten days after confinement.

Dr. Wilmer Krusen, Professor of Gynæcology at Temple College, Philadelphia, does not believe that ergot should be used as a routine practice in all cases of labour, any more than cardiac stimulants or saline transfusion. A positive indication should exist, as when the retraction and contraction of the uterus are not satisfactory, and it is very useful after chloroform. He is of opinion that no well-trained obstetrician will ever use ergot until the completion of the third stage, and condemns its

use during that period, as it is apt to produce retention rather than favour expulsion of the placenta. Far better is a judicious use of Crede's method. Even in post-partum hæmorrhage, ergot is not so effectual as intra-uterine manipulation, or packing the uterus with sterile gauze. Ergot is valuable, combined with strychnia, in preventing puerperal sepsis if the uterus is relaxed. Good contraction is set up, which, by lessening the internal surface, renders infection less liable to transmission through the sinuses and lymphatics, and which also promotes involution.

In the February number of the same magazine, there appeared a discussion on the question "What is the best method of treating uterine inertia?"

Dr. Grandin, Gynæcologist to the Columbus Hospital, says there is no best method uniformly applicable. In the front rank he places prophylaxis during pregnancy, a common cause of relaxation, or lack of contractile force, being want of nerve tone or force. In such cases he gives strychnia ($\frac{1}{60}$th grain) with quinine (1 grain) three times a day during the latter months, neither of these drugs can initiate contractions, although they help when such are present. A too hasty conduction of the third stage causes inertia. The uterus should be given a chance to regain its tone after the birth of the child, before methods of expression are resorted to. Ergot should be given after, and only after, the completion of the third stage. A distended urinary bladder is another not infrequent cause of inertia, and the uterus will often contract when this is relieved by catheterization. Clots, or detached pieces of placenta, may be guilty, and in such case the uterus should be cleaned out by the sterile hand, massage and hypodermic injection of ergot will complete the matter.

In the absence of any of the foregoing causes, he has long since given up the use of hot and cold douches and faradism, and proceeds at once to pack the uterus with gauze. This stops the bleeding and stimulates the uterus to regain tone, and it can be removed, as a rule, within thirty hours. He advises that sterile gauze for packing should always be found in the obstetric bag.

Dr. Polak, Professor of Obstetrics in the New York Post-Graduate Medical School, is accustomed to use, when the membranes are unbroken and the pains irregular and weak, hypodermic injections of morphia ($\frac{1}{4}$ grain) with atropine (1/150th grain), after emptying both bladder and rectum, and packing the vagina firmly with gauze. When the pains have been good and regular, but gradually diminish, he finds nothing acts so well as doses of strychnia (1/30th grain) every half hour until $\frac{1}{3}$th of a grain has been taken. When the waters have drained away, dilatation may be secured by use of hydrostatic bags in conjunction with morphia or strychnia. Failing these, he prefers manual dilatation of the cervix under complete anæsthesia to any mechanical contrivances. When the cervix is fully dilated, if the head is engageable in the brim, forceps offer the best means of ending labour, otherwise he prefers to perform podalic version.

He warns against too rapid delivery, traumatism, and long anæsthesia, as predisposing to inertia.

When the placenta is still in the uterus, and there is no response to

friction, manual removal is best, followed by friction, compression, ergot, or intra-uterine packing.

In the case of inertia following expulsion of the placenta, he has usually found that friction, ergot, and packing have been quite sufficient, and he depends upon these in private practice. Hæmorrhage can be controlled by one hand in the uterus, while the outer hand makes firm counter-pressure.

Dr. Manton, Professor of Obstetrics in the Detroit College of Medicine, pins his faith to strychnia, quinine, and black coffee, getting his best results from the last two.

HYPNOTICS IN HEART-DISEASE.

Cardiac cases do not sleep because they are oppressed, or because a nervous exhaustion has been added to their heart-trouble. In the former case, they are eliminating badly the waste products of nutrition (Huchard's *Dyspnée toxi alimentaire*) and allowing retention of toxines and chlorides to occur in their tissues, and more or less to dilate their cardiac cavities. In the second, and much more frequent case, a condition of neurasthenia has been grafted on to the heart affection. The latter is frequently aortic insufficiency. Neurasthenia, complicating aortic insufficiency, is very often met with, and it is expedient to recognise its presence for the treatment, which aims at nervous fatigue, is vastly different to that which is directed to cardiac insufficiency. The idea of the latter can be discarded when the heart's apex is not displaced outwards towards the axilla, as in the case of dilatation. The lack of hepatic hypertrophy, the absence of swelling of the jugulars, and of tibial œdema are other signs of a sufficiently energetic systole. But when neurasthenia is superadded to heart-disease, attention must be directed to the digestive functions. Absorbent powders and bicarbonates must be given after meals. Constipation overcome, tonic subcutaneous injections of lecithin, of glycero-phosphates, or of different serums should be given, and the use of very short warm baths, lasting 10 or 12 minutes, recommended. Over and above all, the detailed assurance should be impressed upon the patient that his general weakness does not arise from his heart. This is how, in general, the insomnia may be relieved.

Bromides and valerianates will only be called in to help in case the preceding methods fail, or are checked. The fragile state of the stomach in neurasthenia must never be forgotten, and every drug which is given risks aggravating this, bromides in particular. If they are necessary, less risk is involved by giving them by the rectum in the following way:—

℞. Potass. Bromidi - - - - - ʒij.
Aq. destill. - - - - - ʒiij. M.

"One tablespoonful in 3 or 4 tablespoonfuls of boiled water, for injection into the rectum with a rubber syringe."

Insomnia with oppression is due to two causes; one being the retention of the waste of nutrition, and, in this case, it is the kidney which is working badly and fulfilling its filtration duties incompletely; the second is cardiac dilatation, as a result of which the systole is insufficiently accomplished, venous congestions are established, diuresis is lessened, and the cleansing of the system is impeded.

In the former case the treatment will be directed to the kidneys (Huchard's arterial cardiopathies); in the second cardiac tonics, especially digitaline, will be required. The two causes, chlorido-toxic retention and cardiac dilatation, are frequently associated. The treatment of retention by milk diet, dechloridised milk and vegetable diet, and theobromine (two or three cachets of ½ gramme before meals), will be instituted at once, together with treatment by digitaline. In the case of very advanced heart trouble, five drops of the alcoholic solution of crystallised digitaline (1°/₀₀) should be given daily for 15 days, interrupted for a short time, and then resumed.

In the majority of cases the insomnia is relieved by suppressing the provoking cause; but in advanced stages it happens that the foregoing remedies are of no avail. Sometimes, however, the heart is not acting because it is loaded with fat; by making the patient fast the functions are resumed, and the insomnia disappears.

When the insomnia persists in spite of everything, it is the turn of the true hypnotics to come into action. These must always be given in small doses, as large doses weaken the heart and diminish diuresis. One of the best and most easily borne is heroin, in a dose of $\frac{1}{3\frac{1}{2}}$nd of a grain hypodermically at bedtime. Morphia, in doses of $\frac{1}{2\frac{1}{0}}$th of a grain, is equally to be recommended. Both these drugs exert, beyond this hypnotic action, in weak doses, a tonic effect upon the heart. The pulse can often be felt to improve after an injection of a small dose of heroin or morphia. After a time they lose their effect, and then resort must be made to chloral, trional, veronal, or hedonal, all of which demand strict care in management. They should quiet the brain, not the heart. A daily amount of 30 grains of chloral, or 10 grains of veronal, has been sufficient to cause a *bruit de galop* in patients where such did not exist before—a dessertspoonful of syrup of chloral (Fr. Ph. 1 in 20) may be given at bedtime, or 3 to 4 grains of veronal, or 10 grains of trional It is better to portion out the drug in the course of the day, giving a teaspoonful of syrup of chloral every four hours, or a cachet of 1½ grains of veronal or of 2½ grains of trional three times a day. Very small doses of digitaline should be given at the same time. This drug should be given continuously and for a prolonged period. For ten days 5 drops of the 1°/₀₀ alcoholic solution of crystalline digitaline should be given daily, then, for another ten days, 3 drops are given, and this alternation is kept up for months. Heart cases who have not slept for some time have, thanks to this method, recovered normal sleep. (Ch. Fiessinger, *Journal des Praticiens*, No. 13, 1906.)

FEEDING IN MALIGNANT DISEASE OF THE STOMACH.

Martinet reports, in *La Presse Médicale* of 3rd March, the successful use of curds as food for a patient suffering from a new growth involving the stomach and pancreas. Milk and farinaceous diet excited violent symptoms, but the patient took two litres of curds a day and experienced neither pain nor meteorism. The improvement in the general and local condition was so marked that an operation was decided upon, but the growth was found to be too extensive to allow of any interference. It was noticed in the after history of the case, that whenever the diet of curds was omitted, vomiting and pain returned but disappeared again on the resumption of the curds.

LAVAGE OF STOMACH IN DELIRIUM TREMENS.

Serguievsky, who is in charge of the lunatic asylum at Voronége, has for some time past adopted the following method of treatment of delirium tremens with satisfactory results. After a tepid bath of short duration and a simple purgative enema, he proceeds to carry out lavage of the stomach with lime water, diluted with ordinary water or a solution of bicarbonate of soda. This is continued until the fluid is returned from the stomach quite limpid. The patient is then put to bed and given ten drops of a mixture of tincture of nux vomica and tincture of opium in equal parts. Sleep is soon established, on waking from which all phenomena of delirium are found, as a rule, to have vanished. (*Revue de Thérapeutique.*)

THERAPEUTIC VALUE OF ALCOHOL.

In the *Montreal Medical Journal* for November 1905, Blackader gives a summary of the present position of alcohol according to the latest views on the subject:—

1. Alcohol is not an efficient cardiac or respiratory stimulant, but when administered in frequently repeated small doses its action on the circulation may be regarded as favourable. In some conditions with a determination of blood to the interior of the body, as indicated by cold extremities, livid skin, small pulse, scanty urine and high rectal temperature, a condition which has been described as bleeding into the splanchnic area, the administration of alcohol, by dilating the superficial vessels and equalising the circulation, may be of considerable service. Alcohol may also be of value when given to counteract the contraction of the peripheral vessels in the chill or rigor often associated with the onset of disease.

2. Alcohol is not a stimulant to the nervous system. Its action is that of a narcotic, benumbing sensation, including that of fatigue, allaying subjective symptoms, relieving nervous strain, and promoting rest. No other narcotic can be used so freely with so few injurious by-effects.

3. Alcohol in disease is a valuable food, replacing carbohydrates, and as a general rule saving proteid metabolism. It places no tax on the digestive organs; on the contrary, if used intelligently, it increases their secretion, thus, in low and asthenic conditions, assisting the digestion and favouring the absorption of other foods. In such conditions, it may also have a favourable action on the hepatic cells stimulating them to increased activity.

In infections of all forms alcohol should be used cautiously. In such cases, it may be of value to the system either as a food itself, or as favouring the digestion and absorption of other foods, but in large amounts it may and probably will do harm by destroying the resisting power of the organism.

As clinicians, we have to recognise that the effect of alcohol varies much with the individual, and that its employment demands much discrimination and careful and frequent observation. We should also bear in mind that its prolonged use is liable to lead to degenerative changes in the heart, vessels, and secretory organs.—*Therapeutic Gazette* (February, 1906.)

TREATMENT OF WHOOPING-COUGH.

The *Brooklyn Medical Journal* for November contained a contribution from Ager dealing fully with this vexed question. Not much is heard nowadays of the old favourite, belladonna, and its successor, antipyrine, bids fair to join it in deserved neglect. A German remedy, called antitussin, owed its popularity more to skilful advertising than to any definite results achieved by its use. He condemns the tendency now prevalent to leave whooping-cough without treatment of any kind. This is due to the general belief that it is impossible to cut short an attack, and yet it is a common experience that some attacks are shorter and less severe than others, while, in many cases, the disease comes to an end quite suddenly. If the reasons for these differences could be determined, the key to the correct treatment would be in our hands. In whooping cough, the aim of treatment is to remove the cause, the foreign body producing the laryngeal irritation. This may be direct irritation of the mucous membrane by an infectious organism, or an irritation of nerve centres by the toxin produced by the organism. Ager is inclined to the opinion that both causes may be at work and that therefore a systematic attempt should be made to disinfect the mucous membrane locally. For some years past he has been using formaldehyde in accordance with this theory, and although he does not consider it to be the sure specific that it was alleged to be in Germany three or four years ago, he has found it of very great usefulness. He finds that with its use he obtains a larger proportion of mild cases lasting for three or four weeks than without it. Formaldehyde not only acts as a disinfectant, but it stimulates the watery secretion from the mucous membrane, and thus renders the expulsion of the tenacious mucus much easier. It may be generated from a lamp, but Ager now prefers to sprinkle the aqueous solution about the room, on the pillows of the child's bed at night and on the clothes by day, care being taken of course that none actually touches the skin or mucous membrane of the patient.

In addition to this, he gives a combination of apomorphia and codeine which help to reduce tenacity and to soothe irritation. He gives $\frac{1}{30}$th to $\frac{1}{10}$th of a grain of the hydrochloride of apomorphia every half hour for several doses, with longer intervals between the paroxysms. Phosphate of codeine makes an excellent combination; for the stomach, if affected at all by this combination, is soothed.

If the heart gets irritable or out of hand, digitalis will be necessary to quiet it.

He recommends a modification of Kilmer's elastic belt, in which the elastic material is replaced by a plain band of strong unbleached muslin, fastened with safety pins like a "binder." This gives great comfort to the patient and is a useful addition to treatment.

Pulling down the jaw during severe paroxysms of coughing is of great value, especially in nervous children who keep on coughing after the actual irritation has been relieved.

Another mechanical help is to train the patient, when old enough, to cough with the lungs full of air and never with the chest emptied. He remarks that this is a point unknown to many adults, and is a great relief in bronchitis.

As the digestive organs are not upset, the aim in feeding is to circumvent

the vomiting caused by coughing, and food which is readily digestible, or passes quickly out of the stomach into the bowel should, therefore, be given in small quantities frequently, as in this way the patient can be kept well-nourished, a matter of the utmost importance in the treatment.

THE ANÆSTHETIC EFFECTS OF MAGNESIUM SALTS.

The *Medical News* of December 16, 1905, contained an account of the researches made by Meltzer upon the property possessed by salts of magnesium of inhibiting the functional activity of nervous tissue, which was discovered by him about six years ago. He has recently investigated the effects upon animals of subcutaneous injections of small doses of a 25 per cent. solution of sulphate of magnesium. These were carried out with Auer, and the joint results published in the American *Journal of Physiology* in October. The injections produced, in a short time, complete anæsthesia, lasting from one to two hours, and sometimes longer. It was possible to perform various operations during this time. If the dose given exceeded 1·75 grammes per kilo. of weight in a rabbit, the result was fatal. The anæsthetic property was found to belong to magnesium as other salts, the chloride and bromide gave similar results. The narcotic stage is not preceded by a period of excitement, as is the case with other anæsthetics.

The investigators next studied the effect of the application of solution of magnesium salts directly to nerve trunks, and reported their results to the Society for Experimental Biology and Medicine. A marked inhibitory effect was found to occur, and, in the case of the sciatic, pneumogastric and sympathetic nerves of the rabbit, the power of conducting motor and sensory impulses was completely blocked. The conductivity is re-established after a time, which may be shortened by washing the nerve with Ringer's solution.

The explanation offered is that magnesium, a normal constituent of the tissues, exercises a constant inhibitory power over them, and that this function is quite as important to the organism as the factors that make for excitation. From this theory it follows that the anæsthetic effect of magnesium salts, when applied therapeutically, is merely an exaggeration of their normal physiological action.

In December, Meltzer was able to report, in a paper read before the New York Academy of Medicine, that he had succeeded in producing anæsthesia by means of intraspinal injection of magnesium sulphate. His experiments were carried out upon dogs, cats, rabbits, and monkeys. Lumbar puncture was performed, and 1 c.c. of a 25 per cent. solution of magnesium sulphate to every 25 lbs. of body weight was injected into the subarachnoid space, after an equal quantity of cerebro-spinal fluid had been withdrawn. Complete anæsthesia of the lower extremities followed.

Advantage of this new method of control has already been taken by Professor Blake in a severe case of tetanus in a child admitted to the Roosevelt Hospital. Tetanus antitoxin had been injected into the cervical cord on two successive days, but only resulted in a rise of temperature. Thereupon injections of magnesium sulphate were given after lumbar puncture. One c.c. of the 25 per cent. solution to every 25 lbs. of body

weight was the dose used, and it was given every 36 hours, until four doses had been administered. There was a marked and immediate control of the convulsions and opisthotonos, but as this was not permanent, another injection was given. After this, improvement set in, the temperature fell to normal, and the patient was up in a few days.

It is especially noted that the case presented all the characteristics of the usually fatal cases.

IOTHION

Richartz writes on this new preparation of iodine in the *Münch. med. Woch.* (December 5, 1905). Iodide of potassium has long been established as an effective agent in the treatment of the later forms of syphilis, but its use by the mouth is open to many objections. The endeavour to make iodine be absorbed through the skin has up to the present met with no really practical results. In the case of iodipine subcutaneous injections were necessary to introduce iodine into the system, but these could not be left to the patient. Inunction and painting on to the skin are simple and practical methods, but the iodised and iodide ointments were very badly absorbed, even iodvasogen does not act so well as had been thought at first. Iothion is a hydriodic ether containing 80 per cent. of iodine, and it appears to fulfil the condition of great absorption which is required from this sort of preparation. When it is painted on the skin iodine appears in the urine at the end of forty minutes, at the latest two hours and a half, and it is found in the saliva after a quarter of an hour. Iodine introduced into the system in this way remains more or less for a long time, according to the state of concentration in which it is used. Lippschutz states that two grammes of iothion can be painted on the skin daily for any period. Should the application of the pure preparation cause a little dermatitis, an ointment containing 25 to 50 per cent. can be used. The irritation of the skin caused by the use of 50 per cent. solutions in alcohol and glycerine completely disappears at the end of two days.

Richartz has used with complete success external applications of iothion in tertiary syphilis, and has obtained excellent results from it. No gastric disturbances have been caused, although the saliva always contains iodine, but the amount thus introduced into the stomach is infinitely small compared to what is the case when iodide of potassium is taken by the mouth. In some cases iothion has produced symptoms of oculo-nasal catarrh, but of so mild a form that in no case has it been necessary to discontinue the treatment. Under the influence of simple applications to the skin, pains in the head have disappeared in a few days, whilst a palmar psoriasis, which had resisted prolonged treatment by full doses of iodide, disappeared almost entirely after a month's application. Iothion has, therefore, a great practical value, for it allows to pass into the circulation by way of the skin, and at will, sufficiently large quantities of iodine to obtain the therapeutic effect desired. It is a valuable resource in the case of gastric disturbances and of idiosyncrasy.

MILK AND TUBERCULOSIS.

Calmette, the Director of the Pasteur Institute at Lille, recently declared at the Academy of Sciences that, after long years of study and

numerous and repeated experiences, he had arrived at the conclusion that the ingestion of tuberculous products, even when sterilised by heat, can prove very dangerous to those already infected with tubercle, and is certainly not harmless to those free from the disease.

The prevalent idea has been that milk ceased to be dangerous from the moment it was sterilised, and that to keep it at boiling point for some minutes was the best guarantee against a possible attack of tubercle.

As a result of experiments carried out by himself and Breton upon guinea-pigs, it was found that the repeated injection of small quantities of tubercle bacilli killed by boiling hastened death considerably, just as repeated small injections of tuberculin would do. In healthy animals these dead bacilli gave rise to serious troubles, in all respects similar to those observed when non-tuberculous animals are given small doses of tuberculin.

The practical conclusion to be drawn from these experiments is that milk produced by tuberculous cows, even when sterilised, must be absolutely prohibited as a food, especially for children; and, further than this, all dairymen and cowkeepers should be compelled to submit periodically all their beasts to the tuberculin test carried out by properly qualified veterinary practitioners. (*Quinzaine Thérapeutique*, March 10, 1906.)

Notes by the Way.

The Congress.

Once again the International Medical Congress has come and gone, and once again it has passed like a ship in the night and left no mark on the sea of science. It was in some ways a fine pageant, and it is generally agreed that it was a pleasant picnic. It was abundantly evident that this was all most of the members wanted; the work was left to a few enthusiasts who took their pleasures sadly in telling each other what all knew beforehand they would say. The only sections in which even the appearance of scientific interest was kept up were those of Medicine and Hygiene, and in these, for the most part, the audience, if meet, was distinctly few.

Usually the attitude of the audience towards the orator of the moment was that of Falstaff towards the "old lord of the council," who talked very wisely, but he regarded him not. Conversation was general, the President and officers setting the example. The object was to get through the business as speedily as possible. The hours of "work" were nominally from 8·30 till 12; in reality the meetings did not begin till 9 or later, and were generally over by 11. In all the sections many whose names were down to read papers failed to put in an appearance; in some sections there was no one present but the officers; and one actually "ceased upon the midnight with no pain" during the Congress, no meeting at all being held on the last day. It is not surprising, therefore, to learn that not a fraction of the communications on the programme were read even by title.

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The Portuguese Hosts.

The Portuguese were in every way charming as hosts, and all who attended the Congress brought away with them the most pleasant recollection of the welcome they received from every one from the King and Queen downwards. The Portuguese showed a delicate sense of courtesy in keeping their own language in the background. The German element was not so "pushful"

as it generally has been on previous occasions and showed a disposition to fraternise. The English, on the other hand, held themselves aloof in an isolation, which may in their eyes have been "splendid," but which to others seemed ungracious. As usual, this was due to want of organisation.

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The Future of the Congress.

We have before had something to say as to the future of the International Medical Congress, and the recent gathering at Lisbon adds emphasis to the views we have put forward. The meetings are tending more and more to degenerate into international picnics, which, however pleasant in themselves and useful in bringing fellow workers acquainted with each other, do nothing whatever for the advancement of science. The original conception of the Congress was that it should be at once a centre for the exchange of scientific discoveries and ideas, and a means of promulgating *urbi et orbi*, with the whole authority of the profession, the latest teachings of medical science in regard to matters concerning the suppression of disease, the maintenance of public health, and the action that should be taken by States and rulers to give practical effect to those teachings. To all who are really interested in the welfare of the human race it is painful to see how far the Congress has drifted from this intention. From the position of a Universal Council of Medicine it has fallen to that of a trade exhibition. For any higher purpose, indeed, the Congress has become useless. Men go to the meetings largely not to learn—for they know already, through the channels of information which are now almost embarrassingly numerous, all that their colleagues and rivals have to teach—but to show themselves, and to impress on the public mind the fact that any charitable suggestions as to their professional extinction are, as Mark Twain said of the rumour of his own death, "greatly exaggerated." This is the microbe that lurks in all congresses of whatever kind. Its effects can be resisted by a sound constitution, but this is just what the International Medical Congress no longer possesses. It has, in fact, only a very thin-spun thread of continuous life, and this may be at any time "slit" by the "blind fury with th' abhorred shears."

At Lisbon the proposals for the establishment of a Permanent

Committee, which should be the visible link of unity and continuity, and for the increase of the interval between meetings to five years instead of three, do not seem to have been seriously discussed. It was, indeed, resolved that at the next Congress, to be held at Buda-Pest in 1909, no further invitation for a definite date should be received. But nothing has been done to place the organisation of the Congress on a really international basis, and at Buda-Pest, as at Lisbon, the meeting will be a social function that will rejoice the hearts of local hotel keepers, and science will wear motley to make a medical holiday.

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The Eternal Gullible.

No man, even in these days of eager publicity, has more fully understood the significance of the melancholy Jaques's utterance, "All the world's a stage," than John Alexander Dowie. There must be some talent in a man who for years past has contrived to keep the limelight of the press on himself. But what can be said of the newspapers that so obligingly turn the light on him, his goings and comings, his family quarrels, his threats, his boasts, and his curses? Men are naturally fools, but certain newspapers seem to make it their special business to cultivate and develop human folly to the utmost. This, of course, is only an illustration of the economic law of demand and supply. If the public did not demand marvels and sensations, it would not pay newspapers to supply them. The pity is that the tales of mystery and miracle, the vaunts of false prophets, and the lies of quacks, are tricked out with all the meretricious arts of catch-halfpenny journalism, and offered to the ignorant reader without any corrective. To be just, it should be said that we do not think it likely that those whose mental food is such literature would relish any attempt to mitigate the rankness of its flavour. They like to be gulled. Of the truth of this there could be no more curious illustration than the crowds of devotees who have accepted such sorry guides as Dowie and Mrs. Eddy as prophets and teachers. One is driven to believe that neither the progress of science nor the diffusion of the higher education will ever eliminate the "eternal gullible" from human nature. Little has been heard lately of Dowie as a healer, but Christian science, as

the papers bear painful witness, still thrives on human suffering. That so abject a superstition should draw into its bonds the minds, not merely of silly women of fashion in search of a new sensation, but of men who have given proof of courage and good sense in practical affairs, must surprise those who forget that Bacon believed in astrology and Sir Thomas Browne in witches.

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Faith Healing.

AND after all, though so many faith-healers are impostors—conscious or half-conscious or wholly self-deluded,—the thing itself contains an element of truth to which the medical profession, perhaps too obstinately, closes its eyes. The mechanism of faith-healing is the same wherever it works—whether at Epidaurus, or at the famous shrines of India or Mecca, or Lourdes or St. Winifrede's Well—and whether it is exercised by medicine men, marabouts, canonised saints, or Christian Scientists. For the working of what a great surgeon has called the "miracle of cure" by faith, a proper selection of cases is an essential condition. Even Mrs. Eddy does not profess to mend broken bones; in fact, she is shrewd enough to make no claim of healing power over diseases or injuries that lie within the domain of surgery. It is in the almost undiscovered country of pathology, where lie the dark places of nerve-disease—as to which the ignorance of science is but thinly disguised by such names as hysteria and neurasthenia—that faith-healing finds its field of operation. Doubtless, imposture may be a large element in faith-healing, but it is unquestionable that, in the cure of certain kinds of disease, it represents the working of a real force of which little is at present known. Sir Benjamin Brodie wrought many "miraculous" cures in patients who had been bedridden for years from supposed paralysis of the limbs, by simply bidding them get up and walk. Charcot states that he often sent patients to Lourdes whom he had not himself been able to inspire with the requisite amount of faith. Hypnotic suggestion, so far as it has any effect in curing disease, is a form of faith-healing. In all varieties of the process, the patient, in the words of Macbeth's physician, ministers to himself; it is his faith that makes him whole. The shrine or the amulet, the priest or the doctor, are but the instruments that

set in motion a force which quickens into new life the nerve that has ceased to convey the behests of the will. Exactly the same mechanism is seen at work in cases of like character under the operation of fear or strong excitement of any kind. There is a story in Herodotus of a king's son who had been dumb since birth, and who found his voice when he saw his father about to be slain. Abernethy says: "You may see a person with gout who is almost unable to move with pain, but produce a shock on his nervous system by telling him that the house is on fire, and he will scamper about like a lamplighter," and John Hunter states that "even tumours have yielded to the stroke of a dead man's hand." In this way, the unspeakable medicines of the Middle Ages may often have done good.

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Telephone Neuroses.

It is still a question whether the telephone is a boon or a bane. That it is convenient in some ways need not be questioned; but it is equally undeniable that in others it has added a new terror to modern life. Everyone who uses it habitually knows that it can at times display an almost human perversity; to many people the strain of listening to important messages broken by interruptions, and often made indistinct or unintelligible by intercurrent noises, is a sore trial. There is a form of aural disorder caused by this to which the name "telephone tinnitus" has been applied. Dr. Wallbaum of Berlin, as we learn from the *Archives d'Electricité Médicale*, has recently made up a formidable list of symptoms noted in girls in charge of telephones, which constitute a new group of professional diseases. At first the patient suffers from convulsions, fits of weeping, œdema of the extremities, disturbances of sensibility, and even paralysis. Syncope is not uncommon when the condition is well established. The phenomena may, according to Wallbaum, be classified in three groups: 1. Symptoms of over-excitability, headache with giddiness, neuralgias of different kinds, muscular tremors, painful cramps in the pelvic region. 2. Symptoms of exhaustion, paralysis of the vocal cords, hemiplegia, vasomotor disturbances leading to localised œdema and petechiæ, slowness of the psychological processes. 3. Cardiac disorders, precordial pain, arrhythmia,

and sometimes tachycardia. These disturbances are liable to crises of exacerbation accompanied by painful feelings of fatigue and slight clouding of the intelligence. Wallbaum attributes these symptoms to the passage of the electric current; this passage is very frequent, and, according to our author, the girls in the central telephone offices of Berlin are subjected to its influence from minute to minute. Usually its strength does not exceed 5 to 10 volts, but it may be much greater, and it is then that it becomes the cause of nervous disturbances. Dr. Wallbaum is inclined to attribute these to hysteria; he looks upon the series of phenomena as the form of a traumatic neurosis. Another Berlin physician has written a monograph in which the list of evils attributable to the telephone is greatly extended. We do not know whether such effects of telephone work are seen with any particular frequency among us. Doubtless neurotic girls suffer from the strain of work that is peculiarly trying to the nerves. We have therefore thought it well to call attention to Wallbaum's observations.

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The Sanitary Salute.

BACTERIOLOGY, which has revolutionised medicine, is now invading social life. Kissing has been for a long time denounced by the sanitarian; now it is coming under the ban of the legislator. Is it necessary to say that it is in the Land of the Free that the attempt is being made to put down kissing by law? In Virginia it was proposed some time ago that before a kiss could be imprinted on the chaste cheek of a maiden or even of a child a certificate from the family doctor must be produced. The Solons of Georgia and Minnesota have a similar measure under consideration. More recently the Board of Health of Neenah, in the State of Wisconsin, issued an edict against kissing, on the ground that the practice is the direct cause of the spread of contagious diseases. What has been the fate of these measures, and whether, if they ever came into legal being, it was found possible to enforce them, we are unable to say. We have no hesitation, however, in avowing our conviction that at least helpless children should not by social usage be exposed to the risk of contracting consumption and worse diseases from the infected lips of friends of the family, still less of casual

strangers. Dr. Valentin Nalpasse, of Constantinople, has lately spoken strongly on behalf of the children. He points out that they instinctively dislike the kisses of strangers, and submit only—and often with a bad grace—when forced by their parents. He urges that, if the custom cannot be abolished, at least every precaution should be taken to make it harmless. After each walk or visit where the child may have been exposed to promiscuous kissing the mother should see that it is effectively disinfected. The face and hands should be rubbed with a piece of lint soaked in tepid water to which tincture of quillaia has been added. So grave does Dr. Nalpasse think the danger, that even after this purification he recommends that a special disinfectant, which he calls "anti-philima," should be applied.

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The Danger of Handshaking.

It is not only kissing that is condemned by your thorough-going sanitarian. He holds handshaking to be equally dangerous. This, too, it has been suggested, should be made unlawful. There is at least one very important person who would rejoice if such an enactment could be put in force, and that is the President of the United States, who has frequently to exchange hand-grips with thousands of able-bodied citizens. We have not heard whether Mr. Roosevelt has suffered from this practice; we believe that more than one of his predecessors became the subject of a peculiar kind of cramp of the hand in consequence. But it is the flora of the hand that is feared by the sanitarian. How, then, is one to greet a friend in conformity with the most advanced hygiene? To rub noses after the fashion of Tahiti is unpleasant, and not less dangerous. The military salute is *tabu* to the civilian. There remains the Oriental salute, known as *temenah*, which is described by Dr. Nalpasse as follows:—The right hand is carried to the heart, the lips, and the forehead in a graceful gesture, which expresses to the person saluted that he is in your heart, on your lips, and in your thoughts—for ever. To the matter-of-fact British mind this mode of salutation, however graceful it may appear to the Oriental mind, will, we fear, seem a theatrical performance, conveying no meaning but insincere humbug. Fancy going through this ritual in a crowd!

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The Revolt of the General Practitioner.

A COMPLAINT very often heard from the general practitioner is that patients whom he sends to an operating surgeon are simply annexed by the latter. The patient is taken into a home, and the general practitioner knoweth him no more. Of the charges in many of these homes much might be said, but we are not concerned with that point here. It is interesting to note that in France the general practitioner is showing signs of revolt against the high-handed way in which he is treated by the surgeon. In a recent number of that staid and venerable journal, the *Archives Générales de Médecine*, Dr. Berthod sets forth the grievances of the general practitioner. Not only is he thrust aside at the operation and during the after-treatment, but he is made to feel that he is an intruder in the "home" where everything is carefully ordered for the greater glory of the surgeon. In these establishments the general practitioner may consider himself specially privileged if he is occasionally allowed to prescribe a soothing draught. Even when the patient has left the "home" the operator sends his myrmidons—pupils, or it may be nurses—to look after him. The dissatisfaction at this state of things, legitimately felt among general practitioners, has found vent in a scheme for the establishment of local *maisons de santé*. It is proposed to start by establishing three such "homes" conveniently distributed in different quarters of Paris. The patients would be under the care of their own doctors, who would call in specialists in case of need.

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A Correction.

IN THE PRACTITIONER for May it was stated that Sir Astley Cooper was appointed surgeon to Guy's Hospital in 1780. As the context shows that the famous surgeon in 1780 was only 12 years old, the misprint was obvious enough. The date should have been 1800. We are much obliged to a correspondent for calling attention to the error, and we are almost inclined to say *O felix Culpa!* as it has been the means of showing with what a critical eye the journal is read.

The "printer's devil" is a wayward sprite and delights in mischief. With the utmost care it is not always possible to

guard against his tricks. Has not the late Sir Walter Besant left it on record that he wrote an article for an American journal, had it typewritten, had it revised by his secretary, then re-revised it himself? After this it went through the usual editorial mill, being read by the editor, carefully prepared for the printer by the sub-editor, then set up in type, read by the printer's reader, again read by the head reader, then again by the sub-editor, and finally passed for press. Yet after all this superabundance of precautions, the article when published was found to contain the remarkable statement that certain workmen had struck for *lower* wages!

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Competitions.

THE result of the Competition for April is as follows:—The best essay was sent in by Dr. Wm. G. Sutherland, of Holloway, N.; and the best answers to the questions by Dr. Sidney Clarke, of the Newport Borough Asylum, Caerleon, Mon. Cheques have accordingly been sent to these gentlemen.

In the July number of the Journal no questions will be set, but, instead of these, readers are invited to submit for consideration a concise account of any three cases, medical, surgical, or obstetrical, taken from the competitor's own note book. The style of the author will be taken into account, as well as the medical interest of the case. A prize of one guinea will be given to the author who submits the best three cases.

Practical Notes.

THE PHYSIOLOGY OF UREA.—Urea, or as it is sometimes called carbamide, for which the formula is $CO<^{NH_2}_{NH_2}$, is the chief end product of nitrogenous metabolism, or the metabolism of proteid, which takes place in the body, and it is simply excreted by the renal epithelial cells which line the kidney tubules. The quantity of urea excreted is somewhat variable, the chief cause of which, however, depends upon the amount of proteid food which is digested. In the human being in a state of nitrogenous equilibrium, the quantity of urea excreted in 24 hours, is about 500 grains, or 33 grammes; this constitutes about 2 per cent. of the urine. This amount varies, of course, very considerably, because the concentration of the urine varies somewhat in health. A diet, rich in proteid, increases the output of urea, because it must necessarily stimulate the tissues of the body to increased metabolic activity; the nitrogenous waste products of them are finally converted into urea, which is taken by the blood-stream to the kidneys to be excreted. It has been recently shown that a maximum amount of work may be performed by men who are taking, in their food, much less proteid than we in England are accustomed to do, and that, although laborious work is being performed, yet the urea output by the kidneys is less than the 33 grammes in 24 hours as mentioned above. It must be remembered that muscular exercise has very little, if any, immediate effect upon the amount of urea excreted, but during very laborious muscular work, there is a very slight immediate increase in the amount of urea excreted, and this is quite small, when compared with the increased work which has been performed. If it is desired to estimate the total amount of urea excreted in the 24 hours, it is advisable to collect the whole of the urine passed during that time, and then to estimate the amount of urea in a given quantity of it. The estimation of urea may be readily carried out by using the well-known Dupré apparatus, by which the urea is decomposed

by an alkaline solution of sodium hypobromite, and the amount of nitrogen which is set free is then accurately measured. In some cases, however, it is extremely important to know the *total* amount of nitrogen excreted by the kidneys in 24 hours, which knowledge is secured most readily by following out Bernard Dyer's modification of the Kjeldahl method, which is fully described in most books upon practical physiology.

The amount of urea excreted is found to be increased in persons suffering from the specific fevers, in which the katabolic processes occurring in the body are increased. In diabetes mellitus, too, there are more than 33 grammes of urea excreted in 24 hours. A diet rich in proteid also increases the output of urea. Experimentally, it has been found that, if nitrogenous extractives, such as glycin, leucin, or ammonium carbonate, are administered to an animal, there is a large increase in urea output.

It used to be thought that urea was formed in the kidneys. Prévost and Dumas were the first observers to show that, after the kidneys had been completely removed, urea is still formed in the body, and accumulates in the blood and tissues, and similarly, in certain diseased conditions of the kidneys, when they stop excreting, urea is still formed, and accumulates in the blood, the condition being known as *uræmia*. There are two chief sources of origin of urea in the body, the first and most important of these is from *creatine* ($C_4H_9N_3O_2$), a compound produced chiefly in the muscles of the body, and representing the wear and tear of the muscle, which occurs during katabolism. It is possible that the creatine may further be broken up in the muscle into *sarcosin*, or methylamino-acetic acid, and urea, that is, a very small amount of urea may be actually formed in the muscles and tissues of the body. The sarcosin, it is believed, is further broken up into *ammonium carbonate* $CO<^{O.NH_4}_{O.NH_4}$, and this latter, in its turn, is converted into *ammonium carbamate*, which is $CO<^{O.NH_4}_{NH_2}$, and this body is finally converted in the liver into urea or *carbamide*, $CO<^{NH_2}_{NH_2}$. These facts are borne out by Schröder's well-known experi-

ment of mixing ammonium carbonate with some defibrinated blood, and of injecting this into the portal vein of an animal. It is then found that the blood in the hepatic vein contains a greater proportion of urea than normal. If leucin, or glycin, is mixed with defibrinated blood, and then injected into the portal vein, the result is the same as just mentioned, namely, a large increase of urea in the blood contained in the hepatic vein. We have stated above, too, that, if ammonium carbonate is administered to an animal, there will be a large increase in the output of the urea in the urine. These facts seem to show that, in the body, ammonium compounds are the precursors of urea which is finally produced in the liver.

The second source of urea is the amino-compounds and ammonium-compounds, which are absorbed from the alimentary canal. It will be remembered that, during digestion, the proteids of the food are converted, by the action of the pepsin-hydrochloric acid of the stomach and by the trypsin-sodium carbonate of the pancreas, into the albumoses, and then into peptone. The peptone is then further acted upon by the trypsin of the pancreatic juice, and the erepsin of the succus entericus, which is the intestinal juice, into simpler bodies such as leucin, tyrosin, the hexone bases, namely lysin, arginin and histidin, and ammonium compounds. Now it is believed that some of these amino-acids and ammonium compounds may be reconstructed to form proteid molecules, such as serum albumen and serum globulin, but the excess of such bodies, which are absorbed, is taken to the liver in the portal blood stream and there converted by the physiological activity of the liver cells into urea. It has been demonstrated that from one of the above-mentioned bodies, namely, arginin, urea may be directly produced. In this connection it must be remembered that *acute yellow atrophy* of the liver, where the liver cells are seen in all stages of necrosis and in places appear to have undergone complete destruction, the amount of urea in the urine is much diminished, its place being taken by leucin, tyrosin and ammonium salts. The diminution of urea in the urine is probably partly due to the liver cells failing to manufacture urea from the ammonium compounds supplied to them, but it may also be partly due to organic acids seizing

on the ammonia, and in this way preventing the formation of urea out of the basic ammonia. Leucin and tyrosin may, however, be present in the urine in cases of afebrile jaundice, with slight enlargement of the liver (Osler). From the above statements it will be seen, in acute and chronic general disease of the liver, such as acute yellow atrophy, and the various forms of cirrhosis, that in order to procure adequate rest for the liver, proteid metabolism must be controlled to the utmost possible extent, rest for the body and mind must be ordered, and a simple diet, with a minimum amount of proteid, must be chosen for the patient. The same remarks will also apply to cases of acute and chronic nephritis.

Cirrhosis of the Liver.—The commonest cause of this condition, also known as chronic interstitial hepatitis, "hob-nailed liver," or atrophic cirrhosis, is alcohol. The pure spirit, not much diluted and taken without food, is most conducive to this disease, hence the common name of "spirit-drinker's liver." It is generally believed that it is the fusel oil, which is the chief irritating element, though Lancereaux believes that in France, at any rate, the chief agent in the production of cirrhosis is the potassium sulphite, which is used in the "plastering" of wines. In the later stage of this disease *toxic* cerebral symptoms often develop, such as sleeplessness, delirium, or stupor, convulsions followed by coma. The particular toxic agent producing these symptoms has not yet been determined, but it is quite possible that it is one or more of the precursors of urea such as ammonia. Following Dr. Burney Yeo's teaching, there are many factors to be kept in mind in treating a case of alcoholic cirrhosis of the liver :—

1. Forbid all alcohol and irritating ingesta, and order the patient a milk diet; it will be found advantageous to add to each tumblerful of warm or hot milk-and-water 10 grains of sodium bicarbonate. Animal food should be sparingly prescribed, or reduced to a minimum. In the later stages of the disease, animal broths and jellies may, however, be given.

2. Relieve the co-existing gastro-intestinal catarrh and the congested portal circulation. This may be done by regulating

the diet as above, and by ordering the following pill to be taken every other night:—

℞. Podophyllini - - - - gr. ⅛.
Extracti Aloes - - - gr. j.
Saponis - - - - gr. j.
Ol. Menthæ Piperitæ - - ♏ss.
Ft. pil. - - - - In pil. j.

One or two drams of Carlsbad salts in half a tumblerful of hot water should be administered the first thing every morning.

The following medicine may be ordered three times a day about half an hour before food:—

℞. Sodii Bicarbonatis - - - gr. xij.
Potassii Bicarbonatis - - gr. xij.
Spiritus Ammoniæ Aromatici - ʒss.
Aq. Menth. Pip. - - ad ℥iss.
Misce, Ft. Dosis.

3. Relieve hæmatemesis; for this, the following medicine will be useful:—

℞. Acidi Sulphurici Diluti - - ♏x.
Sodii Sulphatis - - - - ʒij.
Magnesii Sulphatis - - ʒj.
Infus. Quassi. - - - - ad ℥j.
Misce, Ft. Mistura.

4. Relieve the ascites by early and repeated tappings, and do not attempt to carry off the fluid from the abdominal cavity by the continued use of hydrogogne cathartics, which seriously reduce the strength and the nutrition of the patient Dr. Cheadle is a strong advocate of *early* tapping as the most trustworthy means of affording relief, and of promoting recovery in those cases where recovery is possible.

5. Relieve, so far as is possible, the toxic symptoms which are due to the atrophy of the liver cells, and the compression of the bile ducts. This may be done by ordering a brisk purge and diaphoretics; at the same time sleep may be procured by the following:—

℞. Chloral Hydratis - - - gr. x.
Sodii Bromidi - - - - gr. xij.
Tincturæ Lapuli - - - ʒss.
Aq. Chloroform. - - - - ℥i.
Misce, Ft. haustus.

The mixture to be taken at bedtime.

6. Maintain the strength of the patient by nourishing food, as mentioned above, and when necessary give tonics.

Sir William Whitla suggests the following :—

R. Acidi Nitro-hydrochlorici Diluti	-	℥ss.
Extracti Taraxici Liquidi	-	℥ij.
Tincturæ Nucis Vomicæ	-	ʒiij.
Extracti Cinchonæ Liquidi	-	ʒiijss.
Infus. Chirat.	-	ad ℥xij.

Misce, Ft. mist.

A tablespoonful to be taken in a wineglass of water four times a day before food.

Case for Commentary in the April Number.—The male patient, aged 40, who was admitted to the hospital suffering from great dyspnœa and subcutaneous emphysema, and who, within a week of admission, developed, on the right side, a pyo-pneumo-thorax, had originally a malignant ulcer commencing in the œsophagus. The cough, from which the patient suffered before admission to the hospital, and which was often paroxysmal in nature, was due to irritation of the recurrent laryngeal nerves, which lie in the groove between the œsophagus and the trachea. The bright red blood "brought up" on two occasions was due to ulceration of the malignant tumour. The ulcer gradually spread to the trachea, and also to the tissues in the posterior mediastinum, and, during an attack of coughing, air escaped through the ulcer into the surrounding connective tissues, hence the emphysema. The disease also spread along the right bronchus to the lung and right pleural cavity, resulting in gangrene of the lung and a pyo-pneumo-thorax, which latter caused some displacement of the heart to the left. The bases of both lungs became congested, and the right base quite collapsed, which naturally accounted for the laboured breathing.

Novelties and Notices.

PROTENE.

(The Protene Company, Ltd., 36, Welbeck Street, W.)

Protene is not a medicine, nor anything in the nature of a drug, but is a purely natural food. It is derived entirely from pure fresh milk, and may be popularly described as a form of dried milk, deprived of its water, fat, and sugar. Physiologically it consists almost entirely of proteid. The patent Protene (Proteid or Proteine) foods prepared by the Protene Company, are manufactured from pure milk proteids. They are varied in character, and many of them are especially suitable for diabetic patients. Among the preparations may be mentioned Protene Gluten, Diabetic Flour, Protene, Diabetic Bread, and Biscuits of different descriptions. The last-named strike us as being exceedingly dainty and appetising—so far as diabetic specialities can be appetising—as well as being very nutritious.

ALYPIN AND SAGODIN.

(The Bayer Company, Ltd., 19, St. Dunstan's Hill, E.C.)

Alypin.—This is a new local anæsthetic, in the form of a white powder, and is a perfect substitute for cocaine. It is easily soluble and, in contrast with a solution of cocaine, can be sterilised by boiling for a short time, without decomposing. It may be employed with advantage in all cases where cocaine has hitherto been used, for the anæsthetising effect of it is equal to that of cocaine, while it appears to be much less toxic and does not produce any mydriasis, derangement of accommodation, or increase of the intra-ocular tension. Alypin is especially useful for local application in laryngological, ophthalmological, urological, and dental practice, and also by reason of the less danger of intoxication, and smaller expense in its use, is to be preferred to cocaine.

Sagodin.—This is a new drug just introduced into therapeutics, and is a tasteless and thoroughly efficient substitute for iodide of potassium, and appears to be free from secondary effects. The sphere of its indications coincides precisely with that of the well-known iodine salts without the ill after-effects of these, denoted by the name of iodism. Its dosage is about the same as that of potassium iodide, and it may be

administered as an inodorous, tasteless powder, in wafers, or as Sagodin tablets.

"TABLOID" BRAND PASTILLES.

(Messrs. Burroughs Wellcome & Co., London, Sydney, and Cape Town.)

We have before us some specimens of these elegant preparations. They are pleasant to the eye and taste, and dissolve slowly in the mouth, thus ensuring the full efficacy of this method of administering the drugs contained in them.

The Cocaine Tabloids contain, in each $\frac{1}{10}$ gr. (·0065 gm.) of cocaine hydrochloride; the Red Gum and Cocaine contain in each 1 gr. (·065 gm.) of red gum and $\frac{1}{20}$ gr. (·0032 gm.) of cocaine hydrochloride, and the Morphine and Ipecacuanha Pastilles contain in each $\frac{1}{30}$ gr. (·0018 gm.) of morphine hydrochloride and $\frac{1}{2}$ grain (·0054 gm.) of pulvis. ipecacuanha. These pastilles are put up in very neat boxes of two sizes, and can be relied upon for the accuracy, activity, and purity of their contents.

"TABLOID" SODIUM CITRATE, gr. 2 (0.13 gm.).

(Messrs. Burroughs Wellcome & Co., London, Sydney, and Cape Town.)

These tabloids, which are issued in small bottles containing 100 in each, have been specially prepared to overcome the difficulties associated with the digestion of artificially prepared foods by infants. It is fully understood that the necessary modification of cow's milk, by dilution and sweetening, in order to approximate it to that of the mother, is often inefficiently carried out. The addition of sodium citrate greatly assists the digestibility of cow's milk, for the calcium salts in the milk unite with the citric acid of the sodium citrate, and the resultant calcium citrate is diluted by the stomach contents and absorbed. The food value of the milk is thus greatly enhanced, and the milk itself so modified as to become an antiscorbutic. In the case of poor patients, who have ready recourse to cow's milk, and who cannot carry out more complicated instructions regarding its modification, these tabloids are specially useful, both on account of their simplicity and cheapness. One tabloid should be dissolved in a teaspoonful of water (not milk) and added to the milk as required; 1 to 2 grains of sodium citrate to each ounce of milk.

COMPETITIONS.

We offer our readers every month two Prizes on the conditions stated below.

A Prize of Two Guineas will be given to the author of the best Essay on a subject to be announced by the Editor.

A Prize of One Guinea will be given to the competitor who writes the best answers to three questions relating to Medical or Surgical Cases.

Results of the May Competitions will be announced in the July number.

a.—The Subject of the Essay for June will be

The Nature and Treatment of Angina Pectoris.

b.—Answers to the following questions are invited :—

1. What are the different kinds of cysts which occur in the Mesentery?
2. What are the causes of Hæmatemesis?
   What are the more important clinical varieties o Enteric Fever?

GENERAL CONDITIONS.

A.—All MSS. relating to the Essay must be marked on the top left-hand corner "Essay," and must be sent to the Editor of The Practitioner, 149, Strand, W.C., on or before the 2nd day of July 1906.

B.—All MSS. giving answers to the Questions must be marked on the top left-hand corner "Questions," and must be sent to the Editor on or before the 2nd day of July, 1906. The answers to the above Questions must not exceed eight hundred words.

C.—No Essay will be returned unless a special request is made, accompanied by a stamped addressed envelope.

A and B.—(1) One side of the paper only must be written on.
(2) The name, or pseudonym, and address of the competitor must be clearly written on each sheet of paper used.
(3) The decision of the Editor is final.
(4) Competitors must be registered General Practitioners.
(5) The attached Coupon must be filled up by each competitor.

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